The

Electrical Review

VOL. XCVII. JULY 17, 1925. No. 2,486.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

Chairman: H. ALABASTER.

Technical Editor: A. H. ALLEN, M.I.E.E. *Joint Managing Directors:* G. H. ALABASTER. E. A. GATEHOUSE, M.I.E.E. A.M.Inst.C.E. *Commercial Editor:* A. H. BRIDGE.

Manager and Secretary: E. S. MIDDLETON.

OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGREKAY, CENT., LONDON," Code, A B C. Telephone Nos.: Central 8260 and 8261.

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s 8d.; Canada, £1 12s. 6d.; Colonial and Foreign, £2 1s. 6d. per annum Cheques and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, LIMITED, and crossed "Midland Bank, Newgate Street Branch."

LIST OF FOREIGN AGENTS (see first page "Official Notices").

Contents:

	PAGE
Electricity Supply, 1920-1923	81
Prosperity and Problems	82
Argentina—an Important Market	83
Electro-farming at the Chester Royal Show	83
The Southern Railway Electrification	83
The Science Exhibits at Wembley	84
An All-electric Housing Scheme (*illus.*)	85
Electricity at the Royal Agricultural Show (*illus.*)	86
The Use of Gas Coke for Raising Steam, by E. W. Dickinson (*illus.*)	87
The Incorporated Municipal Electrical Association (*illus.*) (*concluded*)	89
Business Notes	91
Lighting and Power Notes	94
Tramway and Railway Notes	97
Telegraph and Telephone Notes	97
Radio Notes	98
Contracts Open and Closed	98
Electricity Supply in Yorkshire (*illus.*)	99
Notes	104
Institution Notes	104
Our Personal Column	105
New Companies Registered	107
Official Returns of Electrical Companies	107
City Notes	107
Stocks and Shares	110
The First International Congress of Radiology (*continued*)	111
Developing Community Activities, by V. W. Dale	112
The Glasgow Corporation Tramways	113
The Electrical Imports of Argentina	114
New Electrical Devices, Fittings, and Plant (*illus.*)	115
The International Railway Congress (*concluded*)	116
Correspondence—	
Installation Policy	117
Artificial Crop Drying	118
Radio Trade Discounts	118
The Dimensions of Commutators	118
Celluloid in Accumulators	119
Special a.c. to d.c. Rectifiers	119
A British Institute of Radio Engineers	119
Legal	119
Parliamentary News	120
Published Specifications	120
Contractors' Column	Advertisement page xxxvi

Electricity Supply, 1920—1923.

IT is not often that a reviewer comes across a book containing 580 pages of tables out of a total of 628 pages, inclusive of the index, which he can honestly say is interesting. That such a book is imposing goes without saying, that it is valuable may be assumed, but that it is a book difficult to lay down when once one has dipped into it is a statement which may require justification. Yet this may truthfully be said of the "Return of Engineering and Financial Statistics of the Electricity Commission."* Upon any one connected with the electrical industry, and particularly with the central-station side of it, this volume exercises the same kind of fascination as does "Who's Who" or "Debrett" upon those whose titles to fame have been recently recorded. From the performances of his own undertaking, which he knows by heart already, the engineer will turn to those of the Newcastle-upon-Tyne E. S. Co. or of the Mynyddislwyn Urban District Council, whichever makes the most appropriate comparison, to see how they have been doing. It will then occur to him to look up the records of Little Puddlington-on-the-Marsh to see whether his old friend, John Dogsbody, really is running on 2 lb. of coal per kWh, as he said he was. Name after name will catch his eye, for the records of every authorised undertaking in Great Britain are given with "nothing extenuate nor aught set down in malice," and there will always be just one more undertaking whose records he wants to look at before he lays the volume aside.

At the risk of being tedious, it will be well to state as briefly as possible what the book contains. It covers the three years ending December 31st, 1922, or March 31st, 1923; one could have wished that it brought things down a little nearer to the present, but as the Commissioners are to issue a further Return as soon as possible, and hope to make the publication an up-to-date annual, criticism on this score is unjustified, particularly in view of the immense amount of labour involved in getting the work going at all. Concerning the subject-matter, it may be said that the return includes in all 543 separate authorised undertakings, of which 326 are local authorities and 217 are companies, though not all of these had started supply at the dates mentioned. What may be called the main tables occupy 549 pages of the volume. There are four main tables, the first two relating to engineering matters of local authorities and companies respectively, and the second pair to financial matters. The undertakings are arranged alphabetically for England, Scotland, and Wales, and each has an index number to facilitate cross reference.

* H.M. Stationery Office. Price 15s. net.

The engineering statistics comprise: (1) Nature and frequency of current; (2) voltage at generators and at consumers' terminals; (3) evaporative capacity of boiler plant; (4) type, capacity, and number of main generators; (5) maximum load on station during the year; (6) connected load at end of the year; (7) load factor of undertaking. This information is given on two facing pages. The next pair of pages contains: (8) lb. of fuel (coal or oil) per kWh generated; (9) units generated, purchased, and total; (10) units used in works; (11) units lost and unaccounted for; (12) units sold for (*a*) lighting and domestic purposes, (*b*) public lighting, (*c*) traction, (*d*) power, (*e*) bulk supplies, and (*f*) total. Next comes (13) population of supply area; and (14) units per head of population.

Still at the risk of tediousness, but out of fairness to the Commissioners, the contents of the financial tables must be mentioned. In these tables as many as six pages are required to accommodate the line of figures belonging to each local authority or company. As there are no fewer than 69 different columns of financial statistics, it is necessary to summarise them. Under the heading of "Expenditure Charged to Capital Account" we have 15 columns of details. The next pair of pages are devoted to revenue. We have the quantities of energy sold under the six headings of domestic purposes, public lighting, traction, power, bulk, and total, with, in each case, the revenue obtained and the price per unit. This accounts for eighteen columns, and the remainder on the page deal with revenue from maintenance of public lamps, rental of apparatus, sale of fittings, &c. The final pair of pages deal with expenditure on revenue account and appropriation of gross surplus. Generating costs are only subdivided into "cost of fuel" and "other costs." These, together with "current purchased," make up "total cost of energy," which is given in lump and per unit sold. Adding the figures for "distribution" and "management," we get columns for total working costs, both lump and per unit sold. Other columns give the expenditure on lamp maintenance, rent, rates and taxes, &c. Finally, there is a column for the gross surplus, followed by five more showing how it is disposed of.

One could really hardly ask for more in a work of this description. In the engineering tables it will be noted that there is no mention of the calorific value of the fuel nor of the thermal efficiency of the plant. In omitting data on these points the Commissioners are certainly wise. Nobody believes either the calorific value or the thermal efficiency declared by any station other than his own. The quantity of coal consumed per kWh is, however, an easily ascertainable figure, and as coal has to be paid for, the quantity burnt has to be known accurately. If the consumption of any particular station is high because a low-grade coal is used, the merit of the performance can be appraised by reference to the cost of coal per kWh generated, or sold, which, after all, is the real test.

The tables which form the bulk of the book have been referred to first, because they are of special interest to those concerned with the performance of individual undertakings. There is, however, a broader aspect of electricity supply which appeals strongly to those who, whether connected with the industry or not, are nevertheless interested in the progress being made in its development. Such readers will find their greatest pleasure in the thirty-two "summary tables" which come in the early part of the volume. These are extraordinarily good. Whoever laid down the lines of the book knew exactly what kind of information the general student of the electricity situation would like, and he has saved such students the trouble of digging out the data from a mass of irrelevant figures by doing it all for them.

The first of these summary tables classifies the whole of the 468 generating stations in Great Britain into 22 groups according to size, and gives the number falling into each group. It may be mentioned with regret that the largest group of 53 stations contains plant of between 1,000 and 2,000 kW capacity only, and that 328 stations, or over 70 per cent. of the total, are of less than 5,000 kW capacity. We then come to tables showing the number of steam turbines, reciprocating steam engines, gas engines, oil engines, and water-power plants installed. Another table gives the number of generating sets of various sizes; then we have particulars of the various voltages, frequencies, &c., in the country, and of the units generated, purchased and sold for three consecutive years. Other tables tell us how much of the total was generated by steam, gas, oil, or water. Undertakings are then classified in 13 groups according to annual output, and again in 15 groups according to units sold per head in their respective areas. Further tables show the number of undertakings with various maximum loads and various load factors. We are also told by tables how many plants there are in various groups, classified according to their fuel consumptions, and a dozen or more financial tables deal with expenditure and revenue. Among these, one, giving the number of undertakings selling electricity at various average prices, is particularly interesting. There is indeed hardly a table in the book a discussion of which would not form a subject for a long article. Such articles may be written later. The present object is merely to call attention to the existence of the book and to indicate the nature of its contents. It is a production which is a credit to the Commissioners in every way, and the enormous labour which its compilation must have cost is abundantly justified. Taking it in conjunction with the Return of Administrative Particulars issued in January last, we have to thank the Commissioners for placing at the disposal of the electrical industry the most exhaustive information with regard to the statutory electricity supply undertakings of Great Britain that could possibly be obtained.

Prosperity and Problems.

In his annual speech to shareholders of the General Electric Co., Ltd., which is reported elsewhere in this issue, Sir Hugo Hirst, the chairman, mentioned with justifiable satisfaction that the profit for the year had reached a record, standing for the first time at over a million sterling. The company has resisted the temptation to make a large distribution on the ordinary shares, preferring rather to hold liquid resources at command in readiness for taking advantage of the opportunities which a progressive industry presents for re-investment. The speaker hinted at some scheme or other which may be introduced at a not too distant date for lightening the heavy burden of debenture charges. He also once more expressed the view that is held by all the best-informed minds that, "electrically speaking, we are only at the beginning of things." If that description of the situation be correct when the company operates profitably with a capital of £9,000,000, it is impossible to suggest to what figure the capital of this and other such concerns may ultimately reach as the vast anticipated electrical progress reaches it full development. We cannot, however, look only to the future, for present problems press heavily and demand attention. Sir Hugo Hirst and his colleague, Mr. Railing, have been investigating Continental industrial working conditions, and some of the conclusions arrived at are stated in our report. But most noteworthy of all the subjects touched upon in the speech was that of international electrical co-operation to which we have referred on several occasions in these pages. It is considered that whether we succeed in solving our present difficulties or not, the fact must not be ignored that the absorbing power of the world at the moment is insufficient when compared with the power of production which under war-needs each country increased to double its normal requirements. Sir Hugo advocated international collaboration in facing this situation. What he termed "industrial steadiness" can be gradually recovered and steady recovery of the world be helped, only by the big industries of the principal countries putting their heads

together to discuss standardisation, working conditions, and the sharing of markets. He referred to the difficulties, political and industrial, that might be anticipated if "wild competition" between countries were to be allowed to go on unchecked and in the spirit of the "survival of the fittest."

Argentina—An Important Market.

THE statistics relating to Argentina's imports, which are given in this issue, show that there was a large and fairly general increase during 1923 as compared with 1922. Upon the whole, however, the share of the United Kingdom was not of such satisfactory dimensions as in 1922; both Germany and the United States appear to have increased their proportions at a much greater rate. In some cases we lost ground during the year, notably with regard to accumulators. In this case our exports to Argentina were about halved, while the United States' share was doubled, although we remained the principal suppliers. As regards electrical accessories, in 1923 we ceded the first place to Germany, who increased her contribution by over 60 per cent., while our increase amounted to only about 20 per cent. The United States passed us in the telephone apparatus section, although both our own and Germany's contributions showed a considerable increase. Our supplies of porcelain insulators were almost on a par with Germany's in 1922, but in 1923 our competitors left us far behind. On the other hand, we made a satisfactory advance in respect of the largest item—wires and cables. Although in actual figures Germany's increase was greater, proportionally the position was much more satisfactory as the United Kingdom's share was more than doubled. This country again headed the list in the item "Materials for cells or storage batteries," and a larger advance than those of our principal competitors was recorded. Under the heading "Insulating tubes" we increased our exports by 72,000 pesos, thus ousting Germany from the first place; and the United States fell behind the United Kingdom in the case of switchboards, we having exported six times the 1922 value. We remained behind Germany, Italy, and the United States in our exports of dynamos and motors, the outstanding feature of this section being a very large increase in the German share. We managed to supply more incandescent lamps during 1923, but our figures are small compared with those of Germany and Holland. In another large item, unspecified electrical material, we kept pace with Germany and the United States. The method of classification adopted appears to lead to overlapping or redundancy in some cases, but it must be remembered that it is the official Argentine system.

Electro-Farming at the Chester Royal Show.

IT is a noteworthy sign of the times that so much attention has been paid to the applications of electricity at the farmers' premier show—that of the Royal Agricultural Society of England—at Chester this year. For the first time in the history of this important event a complete public service of electricity was available, and more than 50 stands were using electric current in one way or another. (Of course, there was no demand for lighting in a midsummer show that closed at 8 p.m.) Of the enormous crowd that attended the show, hardly any noticed the overhead distribution lines, which blended well with the low stands, and relieved any feeling of flatness. Incidentally, the Chester Corporation supplies a large rural area, and already has 30 farmers connected to its system. This enterprise is due to Mr. S. E. Britton, city electrical engineer of Chester and ex-president of the I.M.E.A. As Sir Hugo Hirst is on the Committee for next year's Royal Show—which is to be held at Reading—we may rest assured that electricity will be well represented there also.

Another landmark associated with this show was the holding of the first British Electro-Farming Conference in the main conference tent of the Society. The meeting was organised by E.D.A. The chair was taken by the Right Hon. Lord Bledisloe (Secretary in the House of Lords to the Minister of Agriculture). Mr. S. E. Britton opened on behalf of the electricity supply industry, and Sir John Russell (head of the Rothamstead Agricultural Experimental Institute) put the case from the point of view of the agriculturist. Mr. R. Borlase Matthews followed with some notes based upon the actual practical use of electricity in farming work, incidentally announcing a new commercial discovery in connection with the use of electric light for stimulating plant growth. Mr. J. W. Beauchamp then explained the underlying basis of the Conference. Most countries now have special electro-farming conferences, and it is pleasing that this country is not neglecting the matter. There are rumours of an International Electro-Farming and Rural Electrification Conference being held, and it is hoped that it will take place here, now that a start has been made with a home meeting.

In the current issue of the *Journal* of the Royal Agricultural Society of England, a report made by Mr. C. Dampier Whetham appears, as the result of an inquiry made by the Research Committee of the Society. This is another straw which shows which way the wind is blowing. It is a very painstaking and impartial summary of the position of electro-farming in England, though it goes a little astray when questions of electricity supply are considered.

In the columns of the ELECTRICAL REVIEW the case for electro-farming has always been supported. There have been many doubters, and there is still a long row to hoe; however, this Chester Show has focused attention on the subject, and should give great encouragement to the pioneers in this important work. Moreover, the electrical industry generally has been given a very broad hint as to the huge field of work that is opening out for it.

The Southern Railway Electrification.

THE inauguration of the new electric train services on three sections of the Southern Railway on Sunday last was a notable event, opening a new era for one of our oldest railway systems—that known as the South-Eastern and Chatham Railway before it was absorbed in the amalgamation scheme. The South-Eastern suburban system for many years stood in need of conversion to electrical operation, but suffered from lack of capital and credit which prevented the directors from embarking on so costly an enterprise. Latterly its rolling stock depreciated to a marked extent—not only the locomotives but also the passenger coaches, many of which were of antiquated design and construction, and were most uncomfortable; much of the decay was due to the very heavy traffic which these railways had to cope with during the war. Consequently the introduction of brand-new easy-running coaches is almost as gratifying to the passengers as the adoption of electric haulage and the accompanying improvement in speed and in the scheduled service. In passing, we may say that whilst the old S.E.R. bore a bad reputation for time-keeping, it was far from justified, and the frequent jocular references to its leisurely ways were based upon conditions that long ago ceased to exist; we can vouch for its generally high standard of punctuality.

The operation record of the first week-day was unfortunately marred by a number of hitches, none of which was of importance, but which gave rise to a good deal of inconvenience and delay; the trouble was partly due to the simultaneous introduction of a new time-table, which added to the difficulties of the railway staff. There were nine failures of apparatus in 450 journeys, and most of these were attributed to the binding of the brake mechanism, with the result that the trains could not be restarted, and in some cases the main fuses in the motor compartment were blown owing to the attempt to get away overloading the motors. In the course of a week or two the equipment will be in better running order, and we anticipate that the electrification will prove as successful as that of the other Metropolitan services. It is satisfactory to record that there was no failure of the power supply, which is derived from the Deptford generating station of the London Electric Supply Corporation.

D

The Science Exhibits at Wembley.

The Royal Society's Display in the Government Pavilion.

THE Science Exhibition at Wembley forms part of the British Government's participation in the British Empire Exhibition, having been organised, with funds provided through the Department of Overseas Trade, by a committee appointed by the Royal Society under the chairmanship (1925) of Mr. F. E. Smith, C.B.E., F.R.S. In many cases the exhibits, the majority of which are working demonstrations, are shown by the gentlemen actually engaged in the work and are supplemented by apparatus loaned by some of the leading scientific instrument makers.

The arrangement of the principal section of the physical exhibits is based on the extended spectrum of electro-magnetic oscillations and radiations, the experiments illustrating the phenomena met with in the different regions of the spectrum. As a key a large chart shows, in a manner which appeals to the eye, the whole range of radiations now known to be electro-magnetic. According to classical theory, all the types of radiation mentioned on the chart are propagated as strains in the ether of space with a constant velocity which is approximately equal to 30,000,000,000 centimetres per second. There is every reason to believe that the radiations shown on the chart, from the shortest gamma-ray having a wave-length of only 0.000,000,000,2 centimetre up to "wireless" waves having a wave-length of 500,000 centimetres, travel in space with this fixed velocity and that, although their effects are very diverse, the only fundamental difference between the many types of radiation studied lies in the wave-length. The whole range of radiations is divided for convenience into groups; within any group the radiations are similar in their characteristic effects and properties, and the same methods may be employed to detect and produce a wave of any length within a group.

Since a chart in which the lengths of the lines are made proportional to the wave-length would circle the earth very many times, a scale of octaves has been chosen, an octave implying that the numerical value of the wave-length has been doubled. The chart shows about 60 such octaves, and there is an unbroken series of radiations increasing in wave-length from gamma- to X-rays, through the ultra-violet and the visible rays to the infra-red, so to the Hertzian and "wireless" waves, finally ending with the very long waves corresponding to relatively slow electrical oscillations. The wave-lengths are given in centimetres and in Angström units. One Angström unit is equal to 0.000,000,01 centimetre. It is only recently that radiations have been discovered corresponding to all the wave-lengths shown on the chart.

"Wireless" Waves.

Prof. R. Whiddington, F.R.S., demonstrates standing electric waves on a pair of taut wires by association with a closed circuit excited by a spark gap and transformer, *i.e.*, Lecher's system, making use of continuous oscillations sustained by valves. The length of the wires has been chosen for resonance (wave-length, 1 metre), and the standing waves are detected by bridging the wires with a flash lamp. In the usual case of a radio aerial, only part of one wave is formed.

Amongst the numerous exhibits of the National Physical Laboratory is apparatus for determining frequency and wave form (Mr. D. W. Dye). A steadily vibrating tuning-fork, having a frequency of 1,000 vibrations per second, produces, with the aid of a valve amplifier, a circularly-rotating ray in a cathode ray tube which forms the time base. The source of "wireless" frequency oscillations is caused to operate on the ray so that, in the absence of the large circular movement, a small circular movement of the ray is produced at the "wireless" frequency; by carefully adjusting the latter, the light spot in performing its looped journey round the time circle can be caused to arrive at exactly the point from which it started. When this occurs the light spot continually retraces the same path, forming a stationary looped figure. If the two circular motions of the light spot are in the same direction, the ratio of the frequencies is equal to the number of loops minus one. The setting of the "wireless" frequency to a known value consists, therefore, in producing a stationary looped pattern, counting the number of loops, and adding one. By suitable means the time trace can be made a long ellipse. If the "wireless" displacement is adjusted to be a straight line perpendicular to the long axis of the ellipse, the wave form can be examined. Other apparatus (Dr. R. L. Smith-Rose) illustrates the principle of a rotating closed-coil direction finder, while Dr. R. L. Smith-Rose demonstrates the heating effect of the currents induced in a coil by a "wireless" wave by the inclusion of a small glow lamp in the circuit of a receiving coil; the magnitude of the current is approximately indicated by the temperature of the filament.

Other N.P.L. exhibits are a wave-meter showing resonance, rectification by crystals, and the delineation of damped radio waves, while interference is shown between two wave forms from two independent valve oscillators, which are simultaneously projected upon the screen of an oscillograph. If the two frequencies are adjusted so that each is an integral multiple of the tuning-fork frequency, they will interfere with a difference frequency, which is also an integral multiple of the fork frequency. The pattern produced will therefore be stationary and hence visible. By making the amplitudes of the two waves equal, the combined wave will swell up to a maximum and then die down to zero as the waves first reinforce and then oppose one another. If the two waves are unequal, there is a swelling-up and dying-down of the wave of a kind very similar to that produced by modulation at the frequency equal to the difference between the two radio frequencies.

The research laboratories of the General Electric Co., Ltd., shows the bombardment of the anodes of two-electrode valves by electrons and also the change in temperature distribution along an emitting filament. A long thin filament is surrounded by an anode of grid form, and is heated by d.c., being normally of uniform temperature; when a d.c. voltage is applied between filament and anode, and an emission current is taken from the filament, the temperature at the negative end increases visibly and decreases at the positive end. This effect may have serious consequences on the life of a filament. A rectifier is shown rectifying alternating current, and the filament is heated from the same source, but the phase of the filament current can be changed by means of a phase-shifting transformer. When the filament current is in phase with the anode voltage, one end of the filament is always negative when emission current is flowing, and consequently is overheated. When the phase is shifted 90 deg., overheating disappears, for now each end of the filament is equally negative and positive when the emission current is flowing. On shifting the phase another 90 deg., the other end of the filament becomes overheated. A modern development of the original Wehnelt cathode is shown in the form of a cylinder of nickel, coated with mixed oxides of the alkaline earths, heated to a dull red by radiation from an enclosed tungsten filament.

Dr. J. A. Fleming, F.R.S., has a show-case containing specimens of his original rectifying valves, together with examples of modern valves of various types and sizes, contributed by the Mullard, Edison Swan,

B.T.-H., and M.O. Valve Companies. An interesting specimen is the M.O. dull-emitter type DET2 transmitter, which is capable of dissipating 40 watts continuously; its filament voltage is 6 V and current 1.9 A, with an anode voltage of 1,000, a voltage amplification factor of 8.5, and an anode impedance of 5,000 ohms. As a contrast, mention may be made of the Philips-Mullard metal-glass, water-cooled, type Z82 valve that has a maximum output of 50 kW; its filament voltage is 17 V and current 80 A, the anode voltage being from 5,000 to 15,000 V.

Prof. R. Whiddington, F.R.S., exhibits an electrical ultra-micrometer that was devised in 1919-20, which represents one of the many possible applications of the thermionic valve to physical measurement. The principle involved is extremely simple; when the distance between the plates of a parallel-plate condenser is slightly altered, its capacity changes in a way readily calculable, the capacity change being the greater the closer the plates. This change in the present case is observed by noting the change in the high-frequency oscillations maintained by a three-electrode valve in an inductive circuit containing the condenser. The condenser is linked to a spherical ball bearing, so that variations of the diameter of the ball in different directions may be observed. A null method is employed, and by the restoration of the original frequency of oscillation the diameter variation may be computed. The manner in which the restoration is effected is to apply a small bending moment to the stiff bar carrying the movable condenser plate by depressing one end of another much lighter bar through an observed amount. From the observed depression required to restore the original frequency the diameter change can be calculated. While the instrument shown is intended only to indicate changes of about one-tenth millionth of an inch, it has been found possible under favourable conditions, with apparatus of different design, to detect changes of so little as 1/200 millionth of an inch.

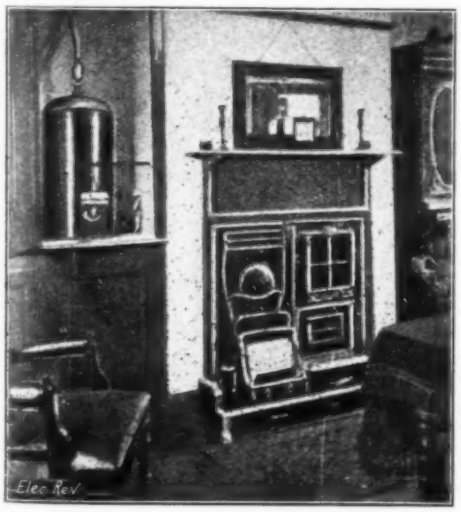
(To be concluded.)

An All-Electric Housing Scheme.

The Gateshead Corporation Enterprise.

CONSIDERABLE enterprise has been shown by the Corporation of Gateshead in providing all-electric labour-saving dwellings at inclusive rentals covering the whole of the electrical equipment. Provision has been made for the erection of 200 such houses, 38 of which have already been completed and are occupied. We learn also that at a recent meeting of the Gateshead Corporation it was decided to equip a further 138 houses on "all-electric" lines.

Different sized dwellings, comprising three-, four-, and five-apartment houses, constitute the general scheme. The average cost of building the houses is approximately £530, and they are let at rentals, inclusive of rates and electrical apparatus, of from 10s. 6d. to 15s. 6d. per week according to size. Each house is equipped with eight to ten lighting pendants (according to size); a 15-A combined switch plug for heating in each room, and one 2-kW radiator for heating; an electric cooker suitable for the requirements of a family of six persons; an electric domestic wash boiler; and a 25-gallon hot-water storage tank, this being fed from a boiler behind the semi-parlour-type of coal-fired range installed in the kitchen, and equipped with a 3-heat control auxiliary electric water heater. Both the wash boiler and the water heater are controlled by main and regulating switches, mounted on the same board as the cooker main switch, in the scullery. An "Osglim" lamp is arranged in circuit to indicate when the wash boiler and the water heater are in circuit.



Portion of Kitchen, Showing the Heating and Water-Heating Apparatus.

The whole of the installations were carried out by direct labour, and have been fitted in accordance with the very latest practice, only the best of materials and workmanship being employed. Energy is supplied at 250 V a.c., and a special sub-station, fed at 6,000 V, has been erected near the centre of the area occupied by the housing scheme. A separate transformer, together with an automatic time switch for its control, is part of the sub-station equipment to provide a street-lighting network at 110 V.

The scheme was prepared by the County of Durham Electrical Power Distribution Co., Ltd., and its successful conclusion may be attributed in a very large measure to the foresight of the Gateshead Corporation Housing Committee, of which Alderman H. Kegie is chairman. Credit is also due to the borough surveyor, Mr. M. P. Pattinson, and his assistants responsible for the actual building operations and electrical installations.

A portion of a kitchen, showing the semi-parlour type coal range, electric fire, and the electric circulating-water heater installed in the cupboard, is seen in the accompanying illustration.

The following are figures of the tariffs extended to the tenants and the estimated consumptions and costs which can be taken as fairly reliable for average conditions. These expenditures are compensated for by the saving effected by the elimination of fireplaces, chimney breasts, flues, and alternative equipment.

TARIFFS.

	Fixed monthly charge.	1—2,040 kWh.	kWh beyond 2,040.
5-roomed house ...	4s. 6d.	1d.	½d.
4-roomed house ...	4s. 0d.	1d.	½d.
3-roomed house ...	3s. 6d.	1d.	½d.

ESTIMATED CONSUMPTIONS AND COSTS.

	Ltg. kWh	Ckg. kWh	Boiler. kWh	Elec. iron. kWh	Total kWh	Cost per week.
5-roomed house	133	1,890	250	26	2,239	4s. 10d.
4-roomed house	112	1,650	250	26	2,038	4s. 2d.
3-roomed house	98	1,500	250	26	1,874	3s. 10d.

Whilst heating and water heating are not included in the estimated costs, it is important to note that these may come within the lower charge of ½d. per unit.

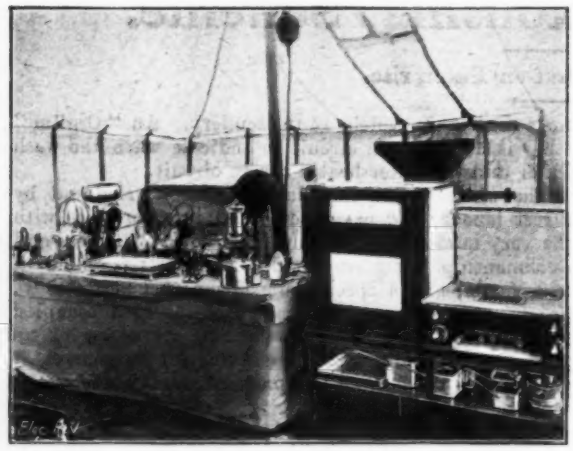
The actual costs of the complete electrical equipment, including wiring, &c., for the different types of dwellings are:—

5-apartment house	£47	12s.	6d.
4-apartment house	£45	0s.	0d.
3-apartment house	£42	7s.	6d.

Electricity at the Royal Agricultural Show.

Practical Demonstrations of Electrical Methods of Farming.

THIS year's Royal Show, held at Chester last week, has established direct contact between the electrical engineering and the agricultural industry, from which, it is hoped, far-reaching results will accrue. There was a profusion of electrical exhibits and working machines, and on the morning of Wednesday, July 8th, an important Conference on Electro-Farming was held on the Show Ground under the chairmanship of Lord Bledisloe. At this Conference several points of view converged: those of the electrical engineer, as expressed by Mr. R. Borlase Matthews; the agricultural scientific experimenter, Sir John Russell; and the agriculturist, Lord Bledisloe. The Conference was attended by several agriculturists interested in the possibilities of the application of electricity to the farm. Viewing the discussions in perspective, one is compelled to take



Part of the Exhibit of the Chester Corporation Electricity Department.

cognisance of the gap that exists between the points of view of the electrical engineer and the farmer, and it seems that only in proportion to the narrowing of this gap is progress in farm installations likely to be registered. Interviews with people attending the Conference confirmed this impression, and although varied opinions were expressed as to the probable outcome of the Conference, upon one point there was noteworthy unanimity, namely, that electrical engineers will have to tackle their problems with the fact in mind that the average farm worker is unversed in even simple mechanics. The engineer's problem is to evolve appliances which are simple, reliable, foolproof, cheap, and almost proof against rough usage. Another important point is flexibility. The horse, it was explained, is so adaptable to farm service that it has become the unit by which are judged the relative merits of the various forms of power, and if electricity can be proved to be quite as elastic and cheaper, there is no gainsaying that there is an enormous scope for it.

This year's Royal Show was epoch-making from another standpoint: it was the first show at which electricity was supplied for driving machinery. The Chester Corporation, on the recommendation of the City electrical engineer, Mr. S. E. Britton, supplied energy free of charge, and close on two miles of overhead lines were erected. Agriculturists had the opportunity of comparing the electrically driven unit with that driven by oil engines, tractors, &c. One suggestion might here be usefully made, namely, that at subsequent shows manufacturers of electrical appliances should arrange among themselves for a compact exhibit showing under one roof what can be done by electric power. Why not a model dairy, electrically equipped? In view of the stimulus that is being applied to the dairying industry to provide Grade A milk, the employment of electrically driven plant would be almost continuous, and not subject to those factors of irregularity frequently unavoidable with other farming processes.

The up-to-date farmer uses machinery for practically every purpose of the field, dairy, and shippon, and although horse power has not yet been superseded, apparently there is a great divergence of opinion amongst farmers as to which is the most suitable form of motive power—gas, oil, or electricity. In the development of farm machinery the Royal Show has always had a great influence, and at this year's Show there were no fewer than 30 entries of entirely new patents. The implement stands attracted great attention, and those that were equipped with electricity for driving exhibits formed quite a pleasant contrast to those distinguishable by the noisy thud-thud of oil engines. Exhibitors of machinery with the electrical drive had abundant opportunity of giving demonstrations to farmers of the positive advantages of electricity on the farmstead, and if for no other than propaganda purposes, the sources of information which were thus opened should yield, if not immediate, then certainly ultimate, positive results. Motors for practically every purpose were on view, and although the electrical exhibits lacked compactness through being so scattered, the start which has been made to show the usefulness of the electric drive for every farm purpose will no doubt lead to improvement at subsequent shows.

The Chester Corporation did its share of the pioneering work with a spirit of generosity. Not only did it run up transmission lines the whole length of the showground, but it also supplied motors and numerous accessories, together with energy free of charge to exhibitors. The Corporation's own stand was visited by thousands of persons each day. This tent was surrounded by a practical demonstration of the construction of 6,600-volt overhead transmission lines, the pressure being transformed down to 400 volts, and the current afterwards distributed by low-pressure lines equipped with the necessary switchgear. If anything, the Corporation's exhibit, at which were given demonstrations in the use of cookers, washing machines, vacuum cleaners, ironers, &c., was rather too small for the crowds that visited it. Not only was an appeal made to the interest of the housewife, but also to the farmer, amongst the machinery on view being a chaff cutter, root cutter, churns, milk separator and refrigerator belt-driven from electrically driven shafting.

Although space will not permit in this issue of giving a detailed description of the numerous stands, one of them, that of Messrs. Young, Osmond & Young was outstanding. It was almost completely electrical, there being close on two dozen electrical exhibits, chief amongst which was a 15-h.p. motor running at 420 V d.c., and an alternator supplying current for operating (1) a 3-h.p. squirrel-cage motor for driving a combined grinding and crushing machine; (2) a 5-h.p. squirrel-cage motor driving barn machinery.

From this source of power there were numerous other applications, such as a shearing machine, electrically heated incubator, a kibbler, electrically heated hay-drying equipment, a pump, a butter churn, fans, irons, kettles, refrigerators, milking machines, &c. An electric tractor with caterpillar tracks was also shown; a length of cable was employed, paid out or wound up according to the position of the tractor. This machine is to undergo practical field trials after the Royal Show. Another interesting exhibit was that of Messrs. Ransomes, Sims & Jefferies. They showed a 15-h.p. motor driving a thrashing and finishing machine.

(To be continued.)

The Use of Gas Coke for Raising Steam.

The Results obtainable on a Commercial Basis.

By E. W. DICKINSON, M.I.E.E.

THE closer accord during the past few months between the prices of gas coke and steam coal is once more arousing interest as to the possibility of using coke for raising steam. Since this relationship is likely to be maintained as a result of steadier Continental conditions, an even greater interest is to be expected in industrial circles generally and amongst power-station engineers especially.

A few notes, therefore, on the properties of gas coke and some information as to the conditions needed for efficient combustion as found in actual practice on chain-grate or travelling-grate stokers of the class now used in most power stations will not be out of place, and may form a guide to those engineers contemplating its introduction as a steam raiser.

It is perhaps asking a little too much of a responsible engineer in the present-day stress of close competition from all quarters to approach the question of burning coke solely from a "national fuel conservation" point of view when this view does not coincide with some immediate or not too remote advantage to the undertaking over which he has charge. Nevertheless, he can always have the national point of view in mind, so that, whenever national and individual interests synchronise, he will be prepared to grasp the opportunity as it arises. It must be admitted that national economies in our fuel reserves can only be made by national action, and this action requires both healthy public opinion and purse as a preliminary to effective legislation.

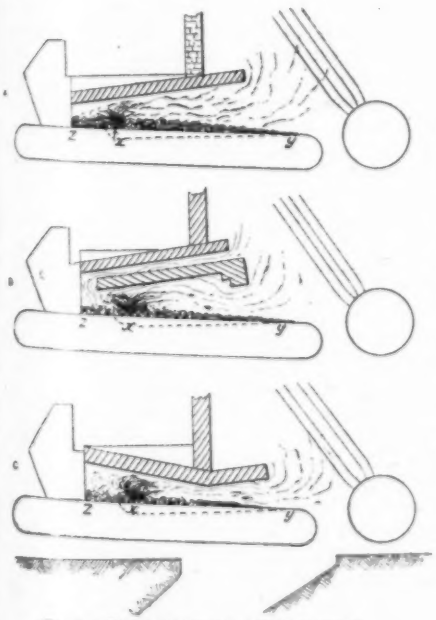


Fig. 1.—The Evolution of the Coke-burning Furnace (Coke alone).

Any extension of the uses of coke is to be welcomed not only as an outlet for an occasional, but inevitable, surplus production, but also as a means of reducing the cost of steam raising for manufacturing purposes, and at the same time conserving the nation's fuel resources.

Gas coke is an important product of gas manufacture, containing over 50 per cent. of the thermal value of the coal carbonised and in itself having a calorific value of 12,500 British thermal units per lb. when dry. The physical form and characteristics of coke as it leaves the gas retort are well known, and need not here be stated at any length. It is, after quenching (with regrettable loss of sensible heat), a hard and gritty substance, the fragments being usually of considerable size and requiring to be broken or cut to approximately the size of a walnut before being suitable for burning on chain- or travelling-grate stokers. Coke of this size requires about 75 cu. ft. per ton storage accommodation, and has an angle of rest of about 40 deg. with the horizontal. It requires approximately an ignition temperature of 1,200 deg. F. A typical analysis of gas coke made from Durham coal and arrived at from determinations taken over a considerable period is as follows:—

	Per cent.
Moisture	8.50
Volatile matter	1.85
Fixed carbon	77.80
Ash	11.85
	100.00

Calorific value, dry, 12,550 B.th.u. per lb.
Calorific value, as received, 11,480 B.th.u. per lb.
Calorific value, net, 11,370 B.th.u. per lb.

The point arresting attention is the low volatile content of this fuel, for whereas steam-raising coal as a rule is found to contain about 30 per cent. of volatile matter, that of gas coke ranges from 1.5 to 2½ per cent. This is at the same time both a disadvantage and an advantage. It is a disadvantage, when considering the adoption of coke alone, because volatile matter distilled from green coal and properly burnt forms a quick and easy means of keeping the furnace brickwork at the required temperature level for igniting the constantly incoming fuel, as it is drawn into the furnace by the stoker mechanism. On the other hand, provided that ignition difficulties are overcome, the absence of hydrocarbons eliminates one of the chief difficulties of fuel combustion. It is one of the ever-present problems of the combustion engineer so to regulate the air supply to coal distillates as to obtain intimate contact throughout between the oxygen of the air and the hydrocarbons. He must not, however, overdo it and bring down with excess air both his CO_2 and his furnace temperature. This difficulty, when coke is burnt alone, being surmounted, very high CO_2 readings are obtainable with resultant good evaporation.

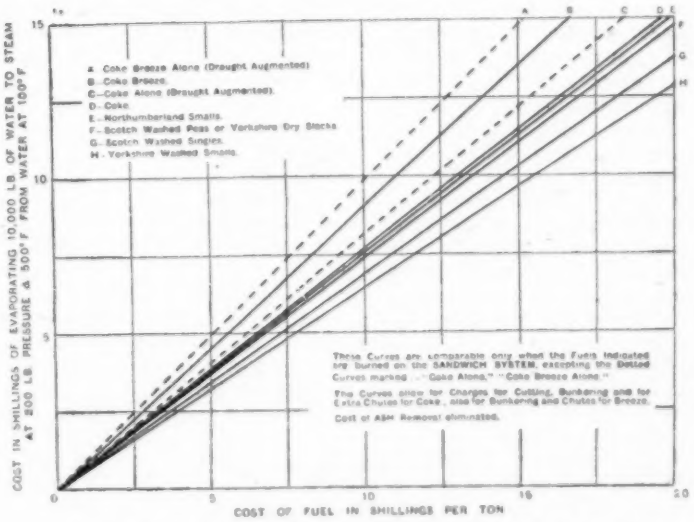

COST IN SHILLINGS OF EVAPORATING 10,000 LB. OF WATER TO STEAM AT 200 LB. PRESSURE & 500° F FROM WATER AT 100° F
A. Coke Breeze Alone (Draught Augmented).
B. Coke Breeze.
C. Coke Alone (Draught Augmented).
D. Coke.
E. Northumberland Smalls.
F. Scotch Washed Peas or Yorkshire Dry Slacks.
G. Scotch Washed Singles.
H. Yorkshire Washed Smalls.
These Curves are comparable only when the Fuels indicated are burned on the SANDWICH SYSTEM, excepting the Dotted Curves marked "Coke Alone," "Coke Breeze Alone."
The Curves allow for Charges for Cutting, Bunkering and for Extra Chutes for Coke; also for Bunkering and Chutes for Breeze.
Cost of Ash Removal eliminated.
COST OF FUEL IN SHILLINGS PER TON

Fig. 2.—The Evaporative Value of Coke compared with that of other Fuels, burnt on travelling grates, with natural draught.

The problem of burning coke alone was approached by the writer in 1916 when in control of a London power station. In 1917 four 5-drum Stirling boilers, each having a heating surface, including superheater, of 3,650 sq. ft. and running at a steam pressure of 200 lb. per sq. in., were equipped with two Underfeed class "A" travelling-grate stokers, each stoker having a grate area of 50 sq. ft. The furnace brickwork setting, being an attempt to design a furnace to burn other fuels as well as coke, was first arranged as per sketch "A," fig. 1, being a simple arch 9 ft. long, rising from a height above grate-level of 10 in. at the hopper end to 30 in. at the boiler tube end; the forced-draught air supply of $1\frac{1}{2}$ to $1\frac{1}{4}$ inches of water was at a maximum at the portion of the grate marked *x*, tailing off to zero at the point *y*, as indicated by the dotted line, and standing at zero between *x* and the hopper end *z*. After preliminary heating of the brickwork by means of a coal fire to ensure a satisfactory start, the brickwork nearest the hopper, unfortunately, gradually cooled down owing to more heat being extracted from the brickwork by the fresh fuel entering than was returned by the reflected heat from incandescent fuel at the rear end of the grate. This resulted in the fire going out after a few hours' run.

Difficulty in maintaining preliminary ignition of the coke as it entered the furnace led to the use of a contra-flow design (arrangement B, fig. 1), by means of which the hot gases of combustion were led to impinge on the incoming fuel, with greatly improved results in so far as it was possible with care to maintain ignition. Finally, by the more simple means of a reverse inclined arch (arrangement C, fig. 1), which reflected the heat from the more intensely incandescent portion of the fire bed at *x* to point *z*, the difficulty was entirely overcome. There remained then only a minor problem, but one that had been manifest during the trials, *viz.*, that of the more complete combustion of the unburned carbon in the ash. This problem was well on the way to solution when in March, 1918, the experiments in burning coke alone were abandoned in favour of the more fruitful method of burning coke on the now well-known "sandwich system," in which a layer of coal is superimposed on the bed of coke. It should be noted, however, in passing that the complete practicability of burning gas coke alone on travelling-grate or chain-grate stokers with forced and chimney draught had been satisfactorily established.

The use of the sandwich system cleared the air of any trace of ignition difficulty, and minimised the loss of unburnt carbon in the ash. It introduced, however, the need for double chutes to each boiler hopper, with consequent capital expenditure. Thus the problem was brought to the commercial issue of an offer for coke at such a price as would cover the cost of breaking, bunkering, and any extra repairs and maintenance due to abrasion that might take place, and justifying any capital expenditure on further chutes. In the case under review this expense was estimated to be covered by an addition of from $7\frac{1}{2}$ to 10 per cent. to the then market price of coke. Orders were placed and resulted in definite economies.

It is satisfactory to record that the use of the sandwich system has introduced a new line of thought in fuel combustion, since not only coal and coke, but coals of varying thermal values and physical properties may be blended, to the advantage of both the commercial and national interests. By trial some advantageous mixture, having regard to market prices, stocks, and other factors, is soon determined, bringing into relief the elasticity of such a system when backed by a suitably divided bunker, chutes, and hoppers.

As a preliminary to gauging the position held by coke as a steam raiser relative to 2 or 3 of our well-known steam-raising coals, it is essential to ascertain as closely as possible the cost of evaporating 10,000 lb. of water by means of these various fuels burnt under the conditions obtaining in the factory. A normal set of conditions is here taken, being those usually present in a steam-driven power station, *viz.*, water-tube boiler, and chain- or travelling-grate stokers, with natural draught. The fuels selected are set out in Table I, with (*a*) their calorific value (*i.e.*, deductions being made for moisture weight and moisture evaporation), (*b*) their evaporative power from and at 212 deg. F, and (*c*) the "actual" year-in year-out boiler-house efficiency. The boiler-house efficiency here given is the ratio of the net calorific value of the fuel burnt, in thermal units, to the thermal units delivered to the water between hotwell temperature, and the resulting steam ready at the turbine stop valves. This efficiency is in many stations, it may be remarked, in close accord with the average "boiler and superheater" performance under test conditions.

Class of fuel.	Per lb. fuel calorific value. Typical analyses. Dry.	Net.	Boiler house efficiency. Fuel burnt on Sandwich System.	Evaporation per lb. of fuel from and at 212° F.	Evaporation per lb. fuel from water at 100° F. to steam at 200 lbs. pressure and 550° F. temperature.
				Lb. of water.	Lb. of water.
Scotch washed peas	12,480	10,060	72	7·46	6·09
Northumberland smalls ...	12,150	10,770	68·5	7·38	5·96
Coke	12,550	11,370	68	7·97	6·44
Coke breeze ...	11,030	9,320	67	6·44	5·20
Yorkshire washed smalls	13,620	11,540	72	8·57	6·92

These figures, having been carefully prepared and checked with due regard to all known factors, should now be set out in some convenient form for reference, as in fig. 2, for the more rapid determination of values with varying costs per ton of fuel delivered into boiler-house bunkers.

The point of intersection of any horizontal line with the curves of the various fuels will show equal evaporating value at varying costs per ton, depending on the fuel used. For instance, it will cost just as much (10s.) to evaporate 1,000 gals. of water by means of coke breeze bought at 11s. 3d. per ton as it will by means of washed slack bought at 15s. 6d. a ton. The point of intersection of any vertical line with the fuel curves gives a varying evaporative value with a given cost of fuel per ton, and it is seen that coke breeze at 10s. per ton will evaporate 1,000 gals. of water at a cost of 8.9s., whereas Yorkshire washed slack at the same price would do the same work at a cost of only 6.4s. The diagram reveals many points of interest. It is apparent on the basis assumed that with coal prices ranging between 11s. 6d. and 14s. a ton, it would pay to adopt breeze as a fuel if it were obtainable at slightly under 2s. a ton less than Scotch washed peas, and at slightly under 4s. 6d. per ton less than Yorkshire washed slack. With coal prices ranging as above, large coke should be obtainable at 2 or 3 pence less than Scotch washed peas, 3s. 6d. less than Yorkshire washed slack, and at about the same price or a little less than Northumberland slack.

As will be noted also an advantage is gained by using *coke on the sandwich system* as against *coke alone* of about 1s. per ton with coal prices ranging as above, the figure in the case of coke breeze being 1s. 6d.

The saving to be expected by using a combination of *coal* and *coke* on the sandwich system may be gauged by taking an example. The grates we will assume are run on natural draught. An offer of coke delivered free is obtainable at 17s. 6d. a ton. This would evaporate 1,000 gallons of water at a cost of 13.4s. Northumberland smalls, let us say, are being burnt at 22s. a ton, giving a like cost of 16.7s. Assuming an evaporation of 500 gallons for each fuel, the cost will be $13.4/2 + 16.7/2 = 15.05$s. Compared with the figure of 16.7, this shows a saving of over 6 per cent. not obtainable without the use of this system. Even if forced draught stokers were available and coke could thereby be burnt alone, the saving would not be so great.

In conclusion, it may safely be stated that by a wise selection of fuel from a field thus extended by the introduction of another class in the form of coke and coke

breeze, and the expenditure of quite a reasonable sum for chutes, &c., many undertakings would derive benefit through lowered cost of power production, which in time would be passed on to the consumer. This would have a beneficial effect ultimately on other industries whose costs of production would thereby be lowered. Having established that such fuel can be burnt as a commercial success under large-capacity steam boilers by mechanical means, the economical utilisation of the nation's fuel resources is at once placed in a more favourable position than heretofore, as under a comprehensive scheme of fuel and power supply to a large community, bituminous coal could be carbonised at existing gas works situated in or near large industrial centres, the gas and valuable by-products recovered and distributed, and the residual coke burnt directly as fuel to produce electricity for power and lighting purposes either in near or more distant areas.

The Incorporated Municipal Electrical Association.

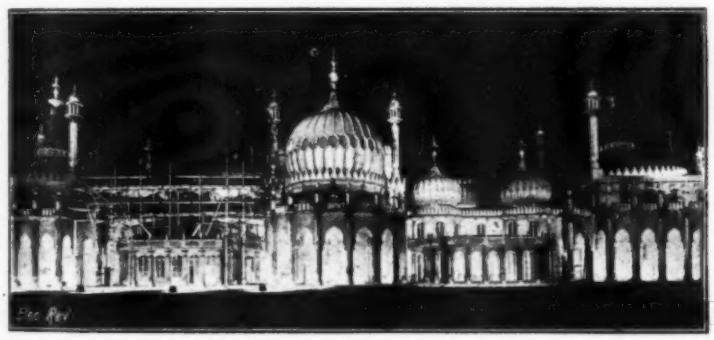
Annual Convention at Brighton.

(*Concluded from p. 75.*)

The Exhibition of Apparatus.

The exhibition of cooking and heating apparatus, which was held in the Corn Exchange, was the most complete and attractive that has yet been held in connection with the Convention; this feature is yearly increasing in value and importance, and we were pleased to see that the manufacturers had made full use of the excellent opportunity afforded them to bring their latest devices before the eyes of supply authorities and of the local public—in some cases new designs were shown which had not yet reached the stage of production in quantity.

The most picturesque display was undoubtedly a striking demonstration of up-to-date shop window lighting, arranged



The Royal Pavilion Illuminated.

by the Electric Lamp Manufacturers' Association. A draper's window, dressed with dainty fabrics, flowers, and models, was illuminated from the sides and from the top by independent circuits with light of constantly changing colours, the possible combinations of tints being infinite in number and the gradual melting of one into another producing exquisite effects. A telling little pamphlet, showing how shop windows are lighted at present, and how they ought to be lighted, was specially prepared for the Convention, and should prove very fruitful in educating not only the public, but also electrical men, in this new and important art.

The lighting of the reception rooms of the Royal Pavilion, and the flood-lighting of its eastern front (here illustrated), were also efficiently organised by E.L.M.A.

Messrs. Bastian & Allen showed their water heaters, fitted with "Quartzalite" elements, and working on the thermal storage principle, maintaining a constant supply of water at scalding temperature. An outside terminal box is used, and the water connections have been improved so that no leakage under the wood lagging is possible. A "boosting" heater of the same wattage as the constant heater is provided, for use when extra demands for hot water occur. We understand that 300 of these geysers are installed in Wimbledon. Other interesting exhibits were the Rex "Little Wonder" grill-oven, taking 1,500 W, and capable of boiling, baking, grilling, or keeping food warm, the capacity being 15 by 9½ by 10 in. high; the Rex "Imperator" radiator, taking 1,000 W; and the Bastian furnace.

Messrs. Benham & Sons, Ltd., showed their "electro-vapour" radiators, in various types and sizes; a 10-kW boiler for tea and coffee, and smaller electric urns; a 3-kW geyser, and a variety of cooking apparatus.

Messrs. Belling & Co., Ltd., in addition to their well-known fires and cookers, and immersion heaters, had an entirely new feature on view—their No. 6 cooker, fitted with the "Honeycomb" boiling plate. This plate differs from any other in that it is built up of rectangular-section bars of fireclay, through each of which the nickel-chrome heating element is threaded. The bars are packed close together, and form a flat plate in direct contact with the cooking utensil; the spirals are of thicker wire than usual, and are protected by the fireclay bars from moving air, and from spilt liquids and solids, so that their life ought to be very long, whilst the sectional construction of the plate allows of free expansion and contraction. Moreover, it is impossible to short-circuit or get a shock from the wholly-enclosed spirals, and the plate can be scrubbed with impunity. A plate loaded at 2.5 kW is said to boil two pints of water from cold in six minutes, and a further two pints in three minutes.

Other improvements have been introduced in the new oven, which is fitted with top and bottom heat, the latter element doing all the general cooking, whilst the top heat speeds up the initial heating and gives the finishing touch. The top heater is also suitable for grilling. Each element is of 1 kW loading, with three heats, on separate switches. The corners of the oven are rounded, and the whole of the elements, grids, and runners can be completely removed for cleaning the inside. All the elements on the cooker are of the plug-in type, with standard "M K" spring sockets, entirely outside the heat zones. The switches are of the "Tok" English make.

The British Electric Transformer Co., Ltd., had two groups of exhibits: the "Sunray" radiators, and the "Tricity" cookers. The former were shown in a little suite of furnished rooms, the æsthetic qualities of the system being an important feature. The "Sunray" is a tubular glow-lamp of special design, housed in a copper reflector in a variety of patterns, some of the radiators containing as many as five lamps, mounted in a horizontal position. Pedestal, wall-bracket, and four-legged types, as well as mahogany stands nearly six feet high, with silk surrounds, were shown. The loading is 200 W per lamp, and the effect of the warm glow is very pleasing, combining light and heat in a manner likened to that of sunshine.

On the company's stand were shown three types of "Tricity" cooker for hiring out, as well as a new small cooker for three persons; this consists of an oven of about one cubic foot capacity, with top and bottom heat, and two 7 by 6 in. rectangular boiling plates mounted close together, so that they can be used as one large plate. One of these plates has single-heat control, with a two-way switch which connects either the plate or the grill, but not both at once. The plates are of the protected open type, loaded to 1,200 watts, and the elements are interchangeable. Cookers for 6 and 10 persons and other appliances were also exhibited.

Carron Company had a good show of cookers, of various sizes and types, and a new wash-boiler in rustless cast iron; this was fitted with very substantial immersion heaters, and the whole made a very sound job.

On the stand of the Credenda Conduits Co., Ltd., in addition to the "Kaybee" and "Creda" electric boilers, fires, and various cookers, a special feature was the "Protector" kettle; this is fitted with a device which, in the event of the kettle being allowed to boil dry, cuts off the current before damage is done. The operation is effected by the melting of a small fuse, which releases a quick-break switch contained in the base of the kettle. A signal at a small window notifies the fact, and a new fuse can be inserted with ease. The device is quite new, and is being protected.

On the "Creda" cookers, plug-in elements are used; the boiling plates are open-topped, and may be provided with cast grids to deflect liquids, &c., from the spirals. The fuses are

enclosed, and the whole of the oven interior is removable. A notable feature of the oven is the facility with which either top and bottom or side heating can be provided, the bus bars being ready drilled for the elements to be attached.

The General Electric Co., Ltd., showed a number of "Magnet" electric cookers, of various sizes, some of which were specially designed for hiring-out. A new hob has been adopted, giving ample space for warming dishes. Other exhibits included a wash boiler, "Magnet" kettles, a variety of small domestic appliances, fires, &c.

Messrs. L. G. Hawkins & Co., Ltd., had a varied exhibit of their "Universal" appliances, including a new electric cooker of polished aluminium, of what we may call the "Prentice" type, and cookers of the range pattern with removable elements and removable interior. A new type of heating element was shown. Besides electric irons and an electric trouser press, there was an electric ironing machine for table use, taking 1,500 W; this was a very handy machine. A "Vio Ray" high-frequency outfit was also exhibited.

The Hotpoint Electric Appliance Co., Ltd., had a comprehensive exhibit of "Hotpoint-Falco" cookers, in which a number of recent improvements were incorporated. The "Standard" model, No. 5,280, designed for the modern electric home, has open boiling plates mounted in a hinged hob; A neat table model was shown, with the same loadings. Hundreds of these cookers have been supplied to the Liverpool Corporation for its 1,000-house scheme, as well as 2-kW immersion heaters which are fixed in the hot-water tanks. Glasgow Corporation is installing the No. 5,280 cooker and the 4-kW wash boiler in a similar 1,000-house scheme.

The Jackson Electric Stove Co., Ltd., showed a number of their cookers, fitted with standard boiling plates over which are grids of an alloy which, it is claimed, neither buckles nor scales. A large hot-cupboard space is provided, and liquids falling through the plates are caught on a reflector plate so that they do not fall into the hot-cupboard. At half heat, the hot portion of the boiling plate is concentrated so as to be suitable for heating a small pan. The Jackson wash boiler was also shown. We were informed that 3,000 cookers had been supplied to five supply undertakings.

On the stand of Metro-Vick Supplies, Ltd., two of the new "Cosmos" cookers were shown. These are fitted with totally-enclosed (B. & K.) or semi-enclosed boiling plates, which are interchangeable with ease, and have the feature that one coil is concentrated in the middle. The semi-enclosed plate has two spiral coils lying in grooves in a glazed porcelain block, slotted to allow liquids to fall through, with a protecting grid of a special metal covering the spirals. The oven is heated at top and bottom with coils on small porcelain bobbins attached to a metal reflector plate, and the grill element is of similar construction. A hinged top plate gives access to the wiring. A large hot cupboard, with a door is provided.

A new pattern of 2-kW Cosmos fire, with two bars, was shown; the spirals are arranged longitudinally, in parabolic grooves, and are not in continuous contact with the porcelain bars, so that they glow directly they are switched on. Other exhibits were the Cosmos Home iron, a table grill and toaster, and a 3¼-pint copper kettle in the construction of which a special hard solder is used which does not melt like soft solder directly the kettle boils dry, the Cadillac vacuum cleaner, a washing machine, &c.

Messrs. George Nobbs, Ltd., showed their "Genii" copper wash boilers, with immersion heaters, the "Vectis" water heater for continuous heating at light load (250 W, with a 1,500-W booster), a 10-gallon urn in nickel alloy, and their towel rails and hot-water radiators. The portable "Vectis" heater, of ¾-gallon capacity, can be run off a lighting circuit, and supplies 5 gallons of hot water per day. Geysers of 9-kW loading, and the "Genii National" calorifier, which is used for a closed system under pressure, and can be automatically controlled, were other features of the exhibit.

A series of "Xcel" cookers was shown by the Siemens and English Electric Lamp Co., Ltd. The cooker is an entirely new pattern, with plug-in boiling ring and grill elements, and easily replaceable oven elements; the grill serves also as a hot-plate and boiling ring. The heating element of the boiling rings is of a new design, consisting of a circular earthenware plate with holes through which the spiral is threaded; pans can stand on the plate itself, or if preferred a solid top can be used. The "Xcel" irons carry a perpetual guarantee.

Messrs. McClary, a Canadian firm, had an interesting exhibit of cookers as used for many years in Canada; these are fitted with "Tor-red" heating elements, in which the spiral is embedded directly in an earthenware plate which will stand running at red heat, the utensils being placed on the plate itself. A cylindrical oven is a popular Canadian type, with top and bottom heat, and dial temperature indicators are fixed in the oven doors. The table pattern has four boiling plates; the elements are of the plug-in type, and the oven interior is seamless, with rounded corners.

An interesting exhibit was an improved pattern of the "Tungar" rectifier of the British Thomson-Houston Co., Ltd. This is now of entirely British make, and we understand that the demand exceeds the supply; it has been adapted to charge high-pressure as well as low-pressure batteries for radio-telephony, giving 2 A at 7.5 V, 1 A at 15 V, 0.1 A at 75 V, and 0.06 A at 100 V. A mistake-proof plug is provided for the change-over.

Several demonstrations were also given in the town. At the "Electric Shop" of Messrs. Galliers, Ltd., North Street, the windows were dressed with G.E.C. "Magnet" irons, "Freezor" fans, washing machines, &c., and the "Gecoray" system of shop-window lighting was installed. Messrs. Hanningtons, Ltd., had an excellent shop-window lighting scheme in use near the Royal Pavilion, and Messrs. Page & Miles, Ltd., also used the "Gecoray" reflectors to advantage. The Hurley Machine Co. had a large exhibit of "Thor" electric washers and wringers, the "Thor" automatic ironing machine and vacuum cleaner, and a small ironing machine, which occupied a space of only 22 by 26 in. when turned up.

A feature of the exhibition was the "Magicoal" fire of Messrs. Berry's Electric, Ltd., of which two admirable examples were shown in operation, looking extremely realistic. Mr. H. H. Berry also welcomed visitors at his electric flat in King's Gardens, Hove, of which we gave a description in our issue of June 12th, p. 943; we found the equipment of the flat even more remarkable than was there indicated, and carefully planned so as to reduce the labour of housekeeping to the minimum.

A Visit to the Electric Farm.

DURING the Convention week an open invitation was extended by Mr. R. Borlase Matthews to all interested to view the farm near East Grinstead, where he puts into practice his well-known theories on the uses of electricity in agriculture. The visitors numbered nearly forty, among whom were included Dr. and Mrs. Ferranti. They were taken through the light and airy cowsheds, where they saw the certified herd and noted the equipment of electrical milking machines. Next, passing to the dairy, they were shown the bottle-sealing and washing machines and the butter-making machines, the power for all of which was electrical. They were particularly interested in the hay-curing equipment, by means of which it is possible to transform green grass into properly-cured hay without the aid of the sun. This has been proved to be very acceptable to cattle, at a lower cost per acre than ordinary hay —thus the farmer can both economise and dodge the "clerk of the weather."

In the poultry-houses the keenest attention was given to the mammoth incubator, capable of hatching 2,400 chicks at once, the success of which lies chiefly in the fact that the warmed air is distributed mechanically by means of electric fans; 3,400 little chicks were cheeping in the brooder or foster-mother house. In the poultry-houses themselves, by means of electric light, the hens are persuaded into thinking that the sun has not set, and thus under the rays of artificial sunlight they continue feeding (instead of having to starve through a long night). As a result, they reward their owner by laying 20 per cent. more eggs in the winter, when their efforts are most lucrative.

An electro-culture high-pressure apparatus for discharge over crops was also viewed, and an electric thrashing machine, an electric plough, and an electric clipping and shearing machine—in all, some 67 different applications of electricity.

In the repair shop of the farm the visitors examined a wireless set specially designed for the use of the farmer, the simplicity of which renders it capable of unskilled manipulation over a very wide range of conditions.

Special Libraries and Information Bureaux.—Following a highly successful conference held at Hoddesdon last year of those interested in special libraries and agencies for the collection, treatment and distribution of information, a representative standing committee was appointed to ensure continuity of the work, and to arrange for a second conference. This committee has been fortunate in obtaining assistance from the Carnegie United Kingdom Trustees, and the proceedings of the first conference have just been issued. The committee has decided to name the body thus called into being "The Association of Special Libraries and Information Bureaux."

The second conference of the Association will be held at Balliol College, Oxford, during the week-end, September 25th to 28th, 1925; full particulars can be obtained from the organising secretary at the offices of the Association, 38, Bloomsbury Square, London, W.C.1.

One of the main functions of A.S.L.I.B. will be to furnish a master-key to our storehouses of knowledge, whether libraries or otherwise. To this end it will aim at co-ordinating in the general interest, the various specialised libraries now in existence, promoting the formation of new libraries where this seems to be necessary; and, as a principle, effecting and aiding liaison between centres of information whatever their scope. It should, however, be noted that A.S.L.I.B. has no intention of building up a vast centralised institution forming a physical location for information, but an expert organisation designed to give the *bona fide* inquirer quick and accurate guidance as to the best and most reliable sources of information available. It will not directly furnish specific information (which would necessitate an enormous staff), but will function rather as a clearing house for sources of information, and as a medium of inter-communication for those engaged in the development and use of informational sources.

New Technical College at Middlesbrough.—The Middlesbrough Corporation has decided on a site for a new technical college, to be erected through the munificence of the Constantine family of shipowners at a cost of £80,000, close to the railway station. The design for the building is by Mr. Graham R. Dawbarn.

Business Notes.

Commercial and Industrial Developments, Business Changes, Trade Opportunities, New Publicity Literature, Liquidations and Failures.

The "Electrical Review" Index. — The Index for the last half-yearly volume of the ELECTRICAL REVIEW (January to June, 1925), is now being printed. Copies will be forwarded post free to those requiring them for binding or for reference purposes, if they will make application to the Publisher, ELECTRICAL REVIEW, 4, Ludgate Hill, E.C.4.

The Electricity Supply Commercial Association. — Mr. G. B. Smith, the general secretary of this Association, writes as follows:—"Quite recently an advertisement appeared in your columns inviting commercial and clerical workers who have had any experience of municipal or company electricity undertaking work to send particulars of their qualifications and experience for enrolment in the Association's Unemployment Register. I may say that the response has been very good and is a tribute to the advertising power of your publication. At the same time I should like to point out that a large number of the applicants possessed engineering qualifications only. Also several correspondents are under the impression that the advertisement also applied to the manufacturing industry. To those who have had clerical experience in the manufacturing industry, of course, employment on costing and accountancy would be very similar, but I should like to have received more replies from those who have been, or are, actually engaged in a municipal or company electricity supply undertaking. May I take this opportunity of thanking all those who responded to the advertisement and to assure them that not only will their names be recorded in the Association's Register, but that in the event of the Association being in a position to notify them of a post, they will receive full particulars as the occasion may arise? Will they also note that my address is now 'Beaulieu,' Bean Road, Bexleyheath?"

Bankruptcy Proceedings.—D. D. RAYNER, 6, Wilson Street, Derby, engineer.—With reference to the report of this public examination published in our issue of July 3rd (p. 12), Mr. Rayner informs us that the first business, *i.e.*, Rayner and Heald, Ltd., was not, as reported, started by him on "borrowed" money, but with money put up by Mr. Platts, who eventually became chairman of the company. From a number of newspaper reports that have been placed before us it appears that in 1919, shortly after the commencement of the company, Mr. Rayner borrowed from Mr. Platts £300 to enable him to acquire a house in Derby for his residence and a promissory note was given for that amount, it being arranged that debtor's share of commission on the profits of the business should be applied toward the liquidation of this debt. Judgment was given against debtor on the promissory note in respect of the £300 borrowed for the purchase of the house, and £200 costs had to be paid. At the public examination debtor said that an action by him against Rayner & Heald, Ltd., was pending. He filed his petition when execution was levied following the Leeds judgment.

S. C. RAPSON, C. L. BURRILL, and A. J. HEFFER (trading as the Suburban Electrical & Maintenance Company), electricians 2, Plough Yard, Shoreditch, E.—A joint statement of the debtors' affairs has now been filed, and it discloses ranking liabilities of £2,813 and established net assets of £677. The following are the chief creditors:—

	£		£
Berry's Electric, Ltd.	22	Metallic Seamless Tube Co., Ltd.	423
Day, Mrs. C. H.	109	Rapson, Miss E. L.	187
E.E.E. Carbon Co., Ltd. ...	24	Rapson, Miss E. M.	669
Falk, Stadelmann & Co., Ltd. ...	26	Rapson, E. J.	110
General Electric Co., Ltd. ...	437	Record, Oswald	34
Hackbridge Cable Co., Ltd. ...	40	Walsall Hardware Co., Ltd. ...	488
Leach, S. G., & Co., Ltd. ...	148	Bird, J.	20

C. B. MAURICE, cable supplier and importer of electrical goods, late of Windsor House, Victoria Street, Westminster, S.W.—The first meeting of creditors in this case was held on July 7th at the London Bankruptcy Court, when accounts were submitted showing liabilities of £745, against assets of 7s. 2d. The receiving order was made on the petition of the C. A. T. Cable Co., Ltd., creditors for £85. It appeared that in 1919 the debtor became director of a limited company carrying on business as merchants. Some five years later he began business on his own account in the same line with a capital of between £100 and £200. He imported electrical goods from Germany, and the business proved a success for six months, but he afterwards experienced difficulty in obtaining delivery of goods, with the result that he lost markets. He lost £500 on horse racing. He attributed his failure to lack of capital, loss of trade, to loss incurred as a bookmaker, and to a judgment given against him in an action brought by the petitioning creditors, and also his counterclaim against them. The estate was left in the hands of the Official Receiver.

S. T. HOSKEN, wireless accessories manufacturer and factor, 153, Fleet Street, E.C.4.—The public examination of this debtor was held on July 10th at the London Bankruptcy Court, the accounts showing liabilities of £953, against net assets valued at £33, after deducting £70 for the payment of preferential claims. Replying to the Official Receiver, debtor said he served with the Royal Air Force during the war, and from April, 1919, to March, 1923, he was in employment. In the latter month he commenced business at 19, Eagle Street, removing in the following November to Fleet Street, where he traded until the receiving order was made against him last May. He attributed his insolvency to bad trade and other causes. The examination was concluded.

A. JONES, electrical engineer, 2, Robert Street, Ynysybwl, Glamorgan.—Trustee, Mr. E. Owen, Official Receiver, 34, Park Place, Cardiff, released June 24th.

D. E. JONES (D. E. Jones & Co.), electrical contractor, 29, Carne Street, Pentre, Glam.—Trustee, Mr. E. Owen, Official Receiver, 34 Park Place, Cardiff, released June 23rd.

W. K. M. WILSON, electrician and wireless apparatus dealer, 1, Mount Street, Heanor, Derby.—Receiving order made July 3rd on debtor's own petition.

F. W. CASELEY (The Radiograph Co.), wireless engineer, 5, Hepworth Arcade, Kingston-upon-Hull.—First meeting, July 15th at the Official Receiver's office, 37, Scale Lane, Hull. Public examination, July 20th, at the Guildhall, Hull.

J. HUMPHREYS, plumber and electrical engineer, the yard behind the Plough Inn, Oldham Road, Rochdale.—First meeting, July 14th at the Official Receiver's offices, Byrom Street, Manchester. Public examination, July 24th, at the County Police Court, Rochdale.

R. S. MAGSON & Co., electrical engineer 10, Stoney Stanton Road, Coventry.—Trustee, Mr. C. J. Band, Official Receiver, 9-11, High Street, Coventry, released June 12th.

A. T. WILLIAMS and W. J. BEVAN (Electrical and General Engineering Co.), electrical engineers, 49, Commercial Street, Aberdare.—Trustee, Mr. E. Owen, Official Receiver, 34, Park Place, Cardiff, released June 25th, 1925.

S. L. BAPTY and N. MILES (The Wireless Instrument Manufacturing Co.), wireless instrument manufacturers, Avenue Works, Avenue Road, Willesden, N.W.—Second and final dividend of 2s. 10d. in the £, payable at Messrs. Poppleton, Appleby and Hawkins, 4, Charterhouse Square, E.C.1.

A. H. DUFFIN and G. KERSHAW (A. H. Duffin & Co.), electrical engineers and contractors, Provincial Buildings, Conway Road, Colwyn Bay.—Second and final dividend of 2s. 10d. in the £, payable July 29th at Mostyn Chambers, Colwyn Bay.

J. S. YEOMANS, 11, Hill View Terrace, Chapel Allerton, Leeds.—Receiving order made July 8th on debtor's own petition.

Private Arrangements.—CAPT. W. L. GRAY, 9, Victoria Parade, Muswell Hill, N., wireless and electrical dealer.—A meeting of the principal creditors in this matter was held on July 6th at the offices of the Marconiphone Co., Ltd., when the chair was occupied by the representative of that company, which was the largest trade creditor. A statement of affairs was presented which showed liabilities of £2,485, of which £2,455 was due to unsecured creditors, and there was a bank overdraft of £30. The assets were estimated to realise £2,950, or a surplus of assets over liabilities, subject to realisation, of £465. It was reported that the debtor came to England in 1922 after serving in the war, and commenced the present business in the December of that year. He had a gratuity of £750 and investments worth £550. Those investments had been realised some time ago at a slight loss. His wife also had £200 and the whole of the moneys were put into the business. After the first fifteen months' trading the debtor made a little under £700 profit from the business which, after drawing about £400 for his personal expenses, left a net profit of £300. The debtor then decided to go into the wholesale business, and that also was quite profitable. Owing to certain conditions of the National Association of Radio Manufacturers the debtor was undersold by at least 10 per cent. in different parts of the country and consequently lost a considerable amount of trade. The chief cause of the present position, however, was that a sum of £800 was owing from a certain gentleman who had promised to pay £200 in the course of a few days and to repay the balance by instalments. If the debtor continued in business he proposed to do away with the wholesale side altogether. On behalf of the debtor a solicitor made an offer of 10s. in the £, payable as to 3s. 4d. in November, 1925, 3s. 4d. in January, 1926, and 3s. 4d. in May, 1926. The largest creditors resolved to advise the acceptance of the offer. A committee of creditors was appointed, and it was agreed that the committee should be vested with the power to advise the debtor to do whatever it thought right. The following are creditors:—

	£		£
British Thomson-Houston Co., Ltd.	85	Igranic Electric Co., Ltd. ...	155
Brown, S. G., Ltd.	183	Marconiphone Co., Ltd.	415
Burndept, Ltd.	162	Metropolitan - Vickers Electrical Co., Ltd.	21
Chloride Eectrical Storage Co., Ltd.	255	Non Aeril Manufacturing Co. ...	28
Dubilier Condenser Co., Ltd. ...	107	Radio Communication Co., Ltd.	36
Edison Swan Electric Co., Ltd.	52	Robinson, L., & Co.	134
Ever-Ready Co., Ltd.	126	Sterling Telephone Co., Ltd. ...	85
Fuller's United Electrical Works, Ltd.	29	Silverex, Ltd.	21
General Electric Co., Ltd. ...	116	Troupe, Curtis & Co.	47
Graham & Co.	91	Watmel Wireless Co., Ltd. ...	22
Greenslade & Brown	23	Watshams, Ltd.	73
		Thomas & Co.	20

THOMAS BARTON, electrical and radio engineer, Electric Works, Ainsworth Street, Blackburn.—The creditors interested herein were called together on July 7th, at Manchester, when a statement of affairs was submitted which showed ranking liabilities of £3,686, all due to unsecured creditors. In addition, there were first and second mortgages on the works to the extent of £3,200. The works were valued at £5,000, leaving a surplus of £1,800. The bank was shown as a creditor for £1,744 in respect of an overdraft, but as security it held a dwelling house of the value of £1,100, and two policies on the life of the debtor of the surrender value of £546, and for the purposes of the statement the bank was treated as being fully secured. The assets were estimated to realise £4,007, from which had to be deducted £50 for preferential claims, leaving net assets of £3,957, or a surplus of £270. Mr. Howarth, solicitor, who occupied the chair, reported that a deed of assignment was executed by the debtor on June 29th to Mr. G. Waterworth, C.A., of Blackburn. The chairman added that the debtor was aged 72, and was probably one of the oldest, as well as the most respected electrical engineers in Lancashire. There was a prospective purchaser for the works. The stock-in-trade was a somewhat difficult one to dispose of, but it was believed that it would realise £1,500. The creditors passed a resolution confirming the deed of assignment already executed to Mr. Waterworth, whilst a committee was also appointed consisting of the representatives of the Greengate & Irwell Rubber Co., Ltd., the General Electric Co., Ltd., and Cryselco, Ltd. The following are creditors:—

	£		£
Anderson, W. A.	137	Kirk & Co.	37
Barton, Miss E.	300	Lancashire Dynamo Co.	94
Beardsell & Co.	54	Lupton, H. E.	59
British Insulated & Helsby Cables, Ltd.	60	Metro-Vick Supplies, Ltd. ...	53
Beaton Metal Co.	38	Northern District Co.	44
Baxendale & Co.	23	Oldham & Son	36
Carter & Sons	34	Pope, E.	48
Cryselco, Ltd.	120	Regent Trust, Ltd.	110
Crabtree & Co.	47	Smith, F.	30
Condor Lamps	21	Siemens Bros. & Co., Ltd. ...	69
Electrical Apparatus Co.	25	Standard Press	26
Eldridge & Morris	122	Smith & Ansell	22
Falk, Stadelmann & Co. ...	44	Sun Electrical Co., Ltd. ...	24
Graham & Co.	23	Samuel & Freedman	180
Greengate & Irwell Rubber Co.	109	James, S. & F. S.	200
General Electric Co., Ltd. ...	101	Toulmin & Co.	26
Gaskell, T.	58	Wandsworth Electric Co. ...	29
Harris Electric Co.	132	Waddie & Co.	43
Higginson Bros.	44	Whittle & Son	47

Company Liquidations.—MARINE AND MECHANICAL ELECTRIC WELDING CO., LTD.—Particulars of claims to the liquidator, Mr. L. C. F. Robson, 146, Bishopsgate, E.C.2, by August 15th.

H. JOSEPH & CO., LTD.—Winding up voluntarily. Liquidator, Mr. N. Bell, 26-27, Bush Lane, E.C.; meeting of creditors, July 21st, at the Institute of Chartered Accountants, Moorgate Place, E.C. Particulars of claims to the liquidator by August 9th.

GAS AND ELECTRIC SECURITIES, LTD.—A petition for the winding up of the above-named company has been presented to the High Court by the Northern Exploration Co., Ltd., of 62, London Wall, E.C., and will be heard in London on July 21st.

Dissolutions of Partnership.—COLEMAN & WARREN, wholesale electrical suppliers, 66, Victoria Street S.W.—Mr. H. E. Clerk and Mr. W. J. Warren have dissolved partnership.

GILFILLAN BROS., radio manufacturers and dealers in radio apparatus, 63, High Holborn, W.C.1.—Mr. K. Gilfillan and Mr. H. W. Cook have dissolved partnership. Debts will be attended to by Mr. Cook, who will continue the business under the same style.

ORAM & LAKIN, THE SHOWMAN'S STORES, and THE SCENIC ELECTRICAL CO., dealers in showman's accessories, 67, Besley Street, Streatham, S.W.—Messrs. A. Oram and R. J. Lakin have dissolved partnership. Mr. Lakin will attend to debts and continue the business.

MAIN & WOODWARD, electrical engineers and contractors, 11, High Street, Barnet, and 11, Abingdon Road, Finchley.—Mr. A. W. Main and Mr. C. L. Woodward have dissolved partnership. Debts will be attended to by Messrs. Boyes & Son, solicitors, Barnet. Each partner will in future trade independently in his own name.

Local Exhibition.—HOLMFIRTH.—As a prelude to the institution of a scheme for the hiring of domestic electrical appliances, the Urban District Council recently organised an electrical exhibition in the Council Chamber. The Jackson Electric Stove Co., Ltd., provided demonstrators for the cooking and other appliances which are being supplied by the company to the Council for its scheme. Alderman Mrs. Hammer (Hackney), chairman of the Electrical Association for Women, attended the opening ceremony and gave an address on the advantages of electricity in the home. The engineer and manager of the undertaking (Mr. J. W. Fawcett) informs us that one result of the exhibition was the placing of a number of definite orders for appliances, including 18 cookers.

Social Events.—The staff of the Willesden Council Electricity Department held its annual outing at Southend-on-Sea on July 4th. There was a record attendance and the party was accompanied by the chief of the Department, Mr. A. W. Blake.

On June 27th the staff of the Dagenite Works of Messrs. Pritchett & Gold and E.P.S. Co., Ltd. with which is incorporated the business of Peto & Radford, spent a very enjoyable day at Brighton. A party of between four and five hundred attended a lunch at the Corn Exchange. Short speeches were made by Sir Archibald Gold, and Messrs. Peto and Roberson.

On July 4th, the employés of the Wallasey Electricity Department held their annual picnic. The outing took the form of a drive through Mold and Loggerheads to Cerrig-y-Druiden, where luncheon was served. The party, numbering about 150, then proceeded, *via* the bank of the River Conway, to Colwyn Bay, where tea was taken, the return journey being made *via* Abergele, St. Asaph, Holywell, and Queensferry. The party included Councillor Hughes, chairman of the Electricity Committee, Mr. B. T. Hawkins, the borough electrical engineer, and his deputy, Mr. E. Cook.

The annual outing of the employés of Messrs. Cunningham, Ltd., Edgware Road, was held on July 12th, when the party went by charabanc to Abingdon.

A Submarine Cable Film.—On July 8th, a large gathering of Press representatives witnessed a film produced under the auspices of the Federation of British Industries with the co-operation of the Eastern Associated Telegraph Companies. The film is designed to impart a knowledge of the nature of cable communication and is divided into three parts. The first section shows the manufacture of a submarine cable in the factory of the Telegraph Construction & Maintenance Co., Ltd. The laying on of the gutta-percha, brass tape, jute, and iron armouring, are shown stage by stage and their functions are explained. The second part deals with the laying and repair of a submarine cable. The officers of a cable-repairing ship are pictured taking the necessary bearings to locate the cable and the repair of a break is carried out. The final section depicts the activities of the staff at Electra House, Moorgate, E.C., the headquarters of the companies. There the organisation for dealing with messages is shown operating at full speed. The film is likely to have a wide popular appeal but more could have been done if it were not for the fact that it is destined to form but a small part of a kinema programme, and is thus confined to a certain length.

Cricket Match.—The Birmingham Electrical Contractors' Association recently challenged the outside representatives of the Birmingham branch of the General Electric Co., Ltd., to a cricket match. The match was played on the ground of the Magnet Club, Witton Works, Mr. A. Berkeley acting as umpire for the contractors. The G.E.C. team compiled a score of 97, and the contractors had amassed 113 for the loss of five wickets when the game was brought to an end by failing light. A social evening at the Magnet Club followed the match.

The Position of the Iron and Steel Industry.—Speaking at Dudley recently, the Home Secretary (Sir Wm. Joynson-Hicks) made mention of the fact that whereas before the war this country imported only a seventh of its wrought-iron requirements, now a third of the requirements was obtained from abroad. He also referred to the position of other branches of the iron and steel industry, and said that if we were to continue to import foreign products made under worse conditions than obtained in this country, we could not expect to be able to compete. Apart from the imposition of import duties, there were only two ways of saving the situation—by inducing French and Belgian trade unions to insist on better wages or conditions, or by the reduction of wages in this country to the level of those of our competitors, which was not desirable.

Trade Announcements.—MESSRS. PHILIPS LAMPS, LTD., have opened a branch office at 21, Stoney Street, Nottingham, with Mr. Howard V. Crisp as manager.

MESSRS. W. E. BURNAND & CO. have completed the removal to the Duo Works, 66-106, Shoreham Street, Sheffield. The new works are more centrally situated than the old, and four times the area is available.

MESSRS. JAMES SCOTT & CO., electrical and radio engineers, have opened new showrooms at Queen Anne Street, Dunfermline, and are showing a selection of the latest electrical fittings, shades, radiators, &c.

The telephone numbers of the Birmingham (Moor Street) branch of the GENERAL ELECTRIC CO., LTD., have been altered to "Central 7944/51" (eight lines).

MESSRS. GEORGE GREEN & CO. have removed from George Street to larger premises at 40, Aybrook Street, Manchester Square London, W.1.

MESSRS. CREED & CO., LTD., inform us that they have purchased Mr. Donald Murray's telegraph business, including the Murray telegraph patents, and they will in future manufacture and supply the Murray Multiplex and other Murray apparatus. Mr. Murray will for a time give them the benefit of his valuable experience in the telegraph field.

The BUDLEIGH SALTERTON ELECTRIC LIGHT & POWER CO., LTD., has opened a showroom and office at Fore Street, Budleigh Salterton, and is desirous of receiving catalogues of wiring materials fittings, and accessories.

The business of Mr. S. LEVETT, of Gravesend, has been reformed under the style of the Gravesend Welding and Electrical Engineering Works, and new premises have been taken in Crete Hall Road.

ENGINEERING DEVELOPMENTS, LTD., has removed from Victoria Street to 13, Page Street, Grosvenor Road, S.W.1.

The Monomarking of Goods.—British Monomarks, Ltd., is the name of a company which has been formed, with offices at 19, Abingdon Street, London, S.W.1, to secure the wide-

spread adoption of Monomarks—an idea that originated with and has been developed by Mr. William Morris and which has the approval of a large number of well-known business men, including representatives of big associations. It is believed that by the adoption of a Monomark—a symbol of four characters—which will be duly registered at Monomark House (to cover two acres in London), manufacturers, traders, and private individuals will be able to have an exclusive mark of their own with which to mark their products, their private belongings—if they will, even themselves. We have not space to elaborate the possible applications of the idea, for the more one thinks of them the more numerous they become, but we may indicate one for the information of business people. A firm of British manufacturers making switches or other electrical articles supplies them to a factor, an exporter, or an overseas agent. They may find their way into the hands of somebody in some remote corner of the globe who knows nobody who can replace them or sell further articles of the kind. The article, however, bears the registered Monomark of the maker, say B.M./K.N.4S., and the customer sends a letter addressed to that mark, c/o London. By arrangement it will be delivered by the Post Office authorities here to Monomark House, where the name and address will be recorded and the letter forwarded to the right place, thus placing the user in direct touch with the maker or the supplier, whichever has adopted the said mark. It is considered that such a system, if widely adopted, for a registration fee of 5s. per annum, will materially facilitate the flow of trade. Readers frequently ask us for the name of the maker of goods bearing a certain trade mark. Our task in this connection would be greatly simplified if there were some universal system of Monomarking. Those who are interested in the matter—and it unquestionably is very interesting and seems to have great possibilities if it is taken up on a sufficiently large scale—should apply to Mr. Morris at the above address for the literature that is available.

Catalogues and Lists.—THE BENJAMIN ELECTRIC, LTD., Brantwood Works, Tariff Road, Tottenham, N.17.—"The Benjamin Reflector," containing illustrations and notes on lighting service, &c.

ELECTRICITY SERVICES, LTD., 27, Martin Lane, Cannon Street, E.C.4.—An illustrated folder dealing with efficient shop-window lighting.

THE EFFICIENCY LAMP SHADE CO., 3 Took's Court, Furnival Street, Holborn Circus E.C.4.—Two illustrated pamphlets advertising the firm's lamp shades with removable glass panels.

THE BRUSH ELECTRICAL ENGINEERING CO., LTD., Falcon Works, Loughborough.—Catalogue 608, illustrating and describing in detail the company's salient pole alternators for engine or water-wheel drive.

THE D.P. BATTERY CO., LTD., Bakewell, Derbyshire.—An illustrated pamphlet dealing with "Kathanode" batteries for electric battery locomotives.

THE CHLORIDE ELECTRICAL STORAGE CO., LTD., Clifton Junction, near Manchester.—An illustrated pamphlet describing the battery installation at a country house.

MR. HARRY MOSS, 82, Leeds Road, Bradford.—An illustrated pamphlet dealing with shop window lighting and a postcard advertising the "Whitecap" electric washing machine.

THE IRON & NICKEL BATTERY CO., LTD., 301, Abbey House, Victoria Street, S.W.1.—A leaflet illustrating the "Ionic" nickel-iron accumulator for omnibus lighting.

Book Notices.—"Scientific Papers of the U.S.A. Bureau of Standards."—No. 504, "A Method of Studying Electrode Potentials and Polarization" (15 cents). No. 505, "Critical Potentials Associated with Excitation of Alkali Spark Spectra" (10 cents).

"Publications of the Massachusetts Institute of Technology."—Contribution from the Electrical Engineering Research Division, Serial No. 44, October, 1924 "Regulator Settings for Long Lines—Automatic Voltage Regulator can be used to arrive at desired operating characteristics.—Theory of Performance, Example of Application, and Analysis of Requirements."

"Combustion and Atmosphere and Their Relation to Disease," by Dr. W. Vernon Sinclair. Pp. 47. London: J. Bale, Sons & Danielsson, Ltd. Price, 2s. net.

"Costruzioni Elettromeccaniche," Vol. II, Sec. 2.—"Transformatori-Motori-Commutatrici Gruppi Varii" by E. Morelli. Turin: Unione Tipografico-editrice Torinese. Price 100 lire.

"Transactions of the Institution of Engineers, Australia." Vol. III. 1922.—Sydney, N.S.W.: The Institution.

"Phases of Modern Science," published in connection with the Science Exhibit arranged by a committee of the Royal Society in the Pavilion of H.M. Government at the British Empire Exhibition, 1925. London: A. & F. Denny, Ltd. Price 3s. 6d.

"The British Engine, Boiler and Electrical Insurance Co. Technical Report for 1924." xxxvii + 161; figs. 127.—Contains many interesting illustrations of defective plant, &c. Published by the Company. Price 7s. 6d. net.

"Approved Wireless Service."—We are informed that the Radio Association, of Sentinel House, Southampton Row, W.C., is issuing a sign to approved wireless dealers able to satisfy the Association's Technical Committee of their standing. It is intended that the sign shall be a guarantee to the public that the firm displaying it can render an authenticated technical service. The sign is an enamelled reproduction of the Association badge.

Australian Municipal Electrical Engineers' Salaries.—The Municipal Officers' Association of Australia has prepared and circulated a new list of salaries, to apply to its members throughout Australia. The salaries claimed for electrical engineers of municipal supply undertakings are as follows:—Supervising electrical engineer, £900; electrical engineer £750; assistant electrical engineer, £600. Under the present award the salaries of these officials vary according to the revenue of the supply undertaking to which they are attached. With revenue varying between £1,500 and £50,000 per annum, the award for a supervising electrical engineer-in-charge varies from £364 to £676; with revenue varying between £1,500 and £30,000, the salaries of an electrical engineer-in-charge and of an assistant electrical engineer respectively vary from £312 to £468 and from £250 to £360. When the list comes up for discussion a sliding scale, somewhat on the lines of the one at present in force, will doubtless be adopted.—*Electrical Engineer of Australia and New Zealand.*

Proposed New Electricity Offices and Showrooms.—The Cardiff Electricity Committee has decided to make an offer of £12,500 for the purchase of premises in Castle Street for the purpose of offices and showrooms for the department.

British Trade Mark Applications. — The following are among the recent applications for British Trade marks. Objections against any of the proposed marks may be lodged within one month from July 8th. In the case of foreign applications, the names and addresses of the British representatives are also given:—

Harmonola. No. 458,687. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—E. A. Graham, trading as Alfred Graham and Co.

C. & E. S. (lettering and design). No. 457,596. All goods in Class 8, but not including electric accumulators or goods of a like kind.—A. B. W. Bergl, trading as the Cable and Electrical Supplies, 234, Pentonville Road, N.1.

Governor. No. 449,313. Class 18. Electric fires, electric hot plates, &c.—John Shaw & Sons (Wolverhampton), Ltd.

Design only. No. 457,868. Class 8. Electric cables.—Naamlooze Vennootschap Hackethal Kabel en Thermophoon Maatschappij, 25, Javastraat, The Hague, Holland (A. A. Thornton, Quality Court, Chancery Lane, W.C.2).

Octopus (lettering and design). No. 458,314. Class 8. Fixed electrical condensers, not being parts of machines.—B. Haine, trading as Radio Stocks (B. Haine), 89, Newman Street, W.1.

Magnaton Aerial Encircles The World (lettering and design). No. 458,557. Class 8.—Aerials Sparklets, Ltd., Angel Road, Upper Edmonton, N.18.

Sunray. No. 458,889. Class 8. Bright and dull emitter valves for radiotelephony.—D. Newton, 9, North Park Road, Roundhay, Leeds.

Tanic (lettering and design). No. 459,184. Class 13. Electric relay cables.—La Société Télémécanique, 5, Rue St. Remy, Liége, Belgium (Feeny and Feeny, 73a, Queen Victoria Street, E.C.4).

Our Foreign Trade.—JUNE FIGURES.—The following were the values of imports and exports of electrical goods and machinery during June, 1925:—

	June, 1925. £	Inc. or dec. £	6 months 1925.
Imports.—			
Electrical goods and apparatus ...	290,734	+ 83,657	+ 658,226
Machinery	933,135	+ 84,544	+ 841,471
(Electrical machinery)	80,273	− 15,353	+ 8,742
Exports.—			
Electrical goods and apparatus ...	845,222	+185,960	+1,382,353
Machinery	3,879,708	+343,419	+3,066,835
(Electrical machinery)	439,951	+ 73,674	+ 535,423
Re-exports.—			
Electrical goods and apparatus ...	14,668	+ 1,425	+ 51,982
Machinery	116,112	+ 30 521	+ 111,546
(Electrical machinery)	4,820	− 3,422	− 16,493

Dutch Interests in Belgium.—The directors of the Lampe Belge propose to increase the capital from 5,000,000 fr. to 10,000,000 fr. by the issue of 10,000 new preference shares and 5,000 ordinary shares. Of the former 8,000 are to be allotted to the N. V. Philips' Gloeilampen Fabrieken, of Eindhoven, in return for the supply of machines and the grant of a licence to utilise patents.

British Manufacturers and Australian Tariffs. — An *Exchange Telegraph* message says that representatives of British manufacturers have urged the Minister of Customs to extend the protection given under the new clause, and pointed out that over 50 anti-dumping orders have been made under section 9. With reference to unfair foreign competition, they suggested that the protective machinery of the Industries' Preservation Act except where it was designed to protect Australian goods against unfair competition from whatever source, should be extended to British interests, thus conferring tariff preference at a time when British public opinion was increasingly favouring Imperial Preference. The Minister replied that the Government fully realised the desirability of fostering British trade with Australia. The position created by the changed currency conditions in Germany was under review, and the Government would shortly introduce into Parliament proposals meeting the deputation's wishes.

The Sydney Council and Tenders for Plant.—In connection with the purchase of plant and machinery for the new power house which the Sydney (N.S.W.) Council proposes to erect, Mr. Forbes Mackay, the city electrical engineer recently recommended that it should be incumbent upon tendering firms to prove that they had had experience in the manufacture of generating sets of 20,000-kW capacity. The Council has decided, however, that as this would exclude Australian firms, none of which has built a machine of this size, it cannot impose any restriction of the nature suggested.

Works Visit.—On July 4th, members of the Derby Railway Institute Radio Society and their friends paid a visit to the works of the D.P. Battery Co., Ltd., Eakewell. The visitors saw in course of production large Post Office batteries and "Kathanode" submarine batteries to a total weight of about 300 tons. Interest was aroused by the water wheels which generate most of the electricity used in the forming and charging processes.

A Change-over of Supply.—A dinner was held at Preston, on July 9th, to mark the official "change-over" from the generating plant at the Dick, Kerr works of the English Electric Co., to the Corporation supply from the Ribble power station. The works plant was only installed two years ago. Henceforth the works will take 1,100 kW from the Corporation; they are the town's first large customer. The existing generating station will be converted into a receiving substation. Among those present at the dinner were Councillor Heaney, Sir Arnold Gridley (general works manager of the English Electric Co., Ltd.), Mr. Livingstone (manager of the Dick, Kerr works), Mr. J. Simpson, the borough electrical engineer, and several textile employers.

For Sale.—By order of the Trustee in Bankruptcy, Mr. E. H. Hawkins, Messrs. Trubshaw & Taylor will sell by auction at 9, Weardale Road, Lee, on July 28th, the stock-in-trade of Moir & Watts, electrical and wireless engineers. By order of the Chief Ordnance Officer, Messrs. Horne & Co. will sell by auction on July 29th, at the Central Ordnance Depôt, Chilwell, Notts, engineering and laundry machinery, wireless stores, &c. By order of the receiver for the debenture holder, *re* Messrs. W. S. Jeal & Ebury Engineering Co. Ltd., of Union Wharf, Redhill Street, N.W.1, Messrs. H. Butcher and Co. will sell by auction at the Victoria Hotel, Mornington Road, on July 22nd, the electric accumulator manufacturing plant and stock, &c. (See our advertisement pages to-day.)

Copper, Lead, and Rubber Prices.—Messrs. F. Smith and Co. report, July 14th:—Copper (electrolytic) bars, £65 15s., 10s. inc.; ditto, ditto sheets, no change; ditto, ditto wire rods, £75 15s., 10s. inc.; ditto, ditto h.c. wire, 9¼d., 3/16d. inc.

Messrs. James & Shakespeare report, July 14th:—No change in the price of copper bars (best selected), sheet and rod; English pig lead, £35 15s. 10s. inc.

Messrs. E. Till & Co. report, July 14th:—India rubber, Para, fine, 3s. 9d., 8d. inc.

The Swiss Glow Lamp Industry.—The Licht A.G., of Goldau, which has absorbed all the Swiss glow lamp makers under the leading of the Osram Company, of Berlin, and the Dutch firm of Philips, has changed its title to the Licht A.G. Ver. Gluhlampen Fabriken, and increased its share capital from 1,400,000 fr. to 2,800,000 fr.

Russian Orders for England.—It was reported last week that M. Rakovsky, the Russian *chargé d'affaires* in Great Britain, had returned from Russia with orders for English firms to the aggregate value of £15,000,000. Specific mention was made of electrical, agricultural, and textile machinery.

Metal Workers and Longer Working Hours.—At the annual meeting of the British Section of the International Metal Workers' Federation, at York on July 11th, a resolution was passed viewing "with much concern" the proposals of the Engineering and Allied Employers' Federation for the extension of the working week. The resolution further called upon the British and other Governments to give effect to the Washington Convention on working hours. Another resolution called attention to the probable effect upon the British metal industries of the attempt by Belgian employers to further decrease the wages of workers in that country's metal trades.

Great Britain and Latin-American Trade.—In addressing a meeting of representatives of the British and Latin-American Chamber of Commerce and visitors from South America at Wembley on July 11th, Sir Douglas Newton, M.P., said, according to a *Financial News* report, that we seemed to be losing from preventable causes some of the trade which we ought to be doing with Latin-American countries. In 1913 the export trade to Latin-America represented something like 9½ per cent. of our export trade, and in 1922 that trade had very considerably dwindled. He hoped that an influx in the Latin-American countries of British capital would be encouraged. Already we had some £1,500,000,000 invested in those countries, and that capital must receive fair treatment because trade could only develop with that.

A French Electrical Syndicate.—The Syndicat Professionnel des Industries Electriques has decided to convert this organisation into the "Syndicat Général de la Construction Electrique." The object of the new association is to group together all the syndicates in the various branches of electrical construction. The combinations already constituted and belonging to the new body are the *chambre syndicale* of makers of heavy machines and the syndicates of makers of other machines, apparatus, and lamps. Other combinations are expected to join. The representatives of the four syndicates mentioned have established a provisional office for the general syndicate, with M. Charles Laurent as the president.

Large German Cable Order.—The *Financial Times* reports that the Felten & Guillaume Co. has received the order for a submarine cable from Emden to the Azores. This will occupy the Nordhammer works of the company for about a year.

Lighting and Power Notes.

Accrington.—ELECTRICITY IN BULK.—The Corporation has been asked for the terms upon which it would be prepared to furnish a bulk supply of electricity to Burnley. The matter has been referred to a special committee for consideration.

Algeria.—BISKRA.—The Société d'Electricité de Biskra is in negotiation with the municipal authorities of that town with regard to the extension of the concession for a further 40 years.

Basingstoke.—YEAR'S WORKING.—The accounts for the past year's working of the undertaking (engineer: Mr. F. Swarbrick) show a total revenue of £15,040, as compared with £13,945 for 1923-4. The working costs were £7,705, against £5,885, leaving a gross surplus of £7,334 (£8,060). After deducting the capital charges, a net profit of £2,387 is shown, excluding £500 placed to the reserve and renewal fund, against £3,606 for the preceding year. The capital expenses for the year were £4,180, including £2,533 for mains, making a total capital expenditure of £65,683. The energy sales for the year amounted to 1,027,155 kWh, and the maximum demand on the station was 637 kW.

Brighton.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £22,400 in connection with the supply of electricity to Rottingdean and the Portobello districts.

Birmingham.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £550,000 for plant and £100,000 for buildings.

Caerphilly.—ELECTRICITY SUPPLY.—The Urban Council, after considering a scheme of electric lighting submitted by Messrs. Arthur Ellis & Partners, consulting engineers, has decided not to embark upon an electricity scheme for Tredegar.

Canterbury.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £3,000 for a new feeder cable from the electricity works to Wincheap Street.

Chesterfield.—EXTENSION OF SUPPLY.—The Electricity Committee has been informed of a proposal to form the Whittington and District Electricity Supply Co. for the purpose of supplying electricity to New Whittington and District. The town clerk has replied that the Corporation has decided to extend its mains to New Whittington, and that therefore consent to the proposed company's affording a supply cannot be given.

Continental.—BELGIUM.—At the recent annual meeting in Brussels of the Société d'Electricité du Nord de Belgique it was stated that the company's power station was now supplying electrical energy to no fewer than 100 localities with a total population of 526,000. During the past year the company's distributing mains had been extended to a total of 1,030 miles, of which 476 miles was primary and 554 miles secondary mains. Fifty-five miles of 50,000-V aerial transmission lines had also been completed between Louvain and Tirlemont and between Malines and Baesrode.

SWITZERLAND.—The Brown Boveri Co., of Baden, has commenced work on the establishment of a h.p. main to connect the hydro-electric stations at Laufenburg and Murgental. The cable will be carried on masts ranging in height from 82 to 94 ft., and spaced at intervals of about 220 yards. The line is later to be extended to the Ruhr coal mining area so that in periods of plentiful water supply energy can be exported to Germany, and in water shortage periods electricity can be supplied from the power stations in the Ruhr coal area.

Coventry.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. G. Tough) record a total revenue of £258,665, as compared with £221,417 in 1923-24. Against this was charged working expenditure of £158,279, as against £116,415, leaving a gross profit of £100,385 (£105,002). After deducting capital and other charges, there was a net surplus of £37,175, as compared with £47,944 in the preceding year. The capital expenditure during the year amounted to £44,194, the chief item being £30,910 for mains and services. The amount of energy sold was 55,137,692 kWh, an increase of 27.2 per cent., and the average price per kWh obtained fell from 1.224d. to 1.126d. The number of consumers increased from 11,283 to 12,529.

Cuckfield.—OBJECTION TO OVERHEAD LINES.—The Urban Council having maintained its objection to the overhead system of supplying electricity to the town, the Haywards Heath Electric Supply Co. has intimated to the Council that an appeal is being made to the Ministry of Transport for consent to use overhead lines.

Dover.—ELECTRICITY IN BULK.—An agreement has been reached between the Town Council and the Folkestone Electricity Supply Co. for a mutual supply of electricity in bulk. The supply is to be by overhead cable along the Dover-Folkestone road.

Douglas (I. of M.).—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking (engineer: Mr. B. Kelly) for the year ended March 31st last shows a total income of £13,878, as compared with £7,254 in the preceding year in which the supply was commenced. Working expenses amounted to £7,529 (£3,045), leaving a gross profit of £6,349 (£4,408). After providing for capital charges, there was a

net surplus of £2,966, as against £1,103 in 1923-24. The capital expenditure, which included £13,737 for machinery, amounted to £28,549. The sales of electrical energy increased from 365,583 to 554,031 kWh.

Dumfries.—PROPOSED HYDRO-ELECTRIC SCHEME.—The Town Council proposes to proceed with a scheme for harnessing the River Nith for generating electricity, and a deputation is to visit Chester to inspect a similar scheme in operation there. The ultimate cost of the undertaking will be £15,000, but it is only proposed to proceed with a portion at first at a cost of £2,500.

Eastbourne.—INQUIRY.—The Ministry of Transport is to hold an inquiry with regard to the application of the Corporation to erect overhead lines in Willingdon.

East Anglia.—ELECTRICITY IN BULK.—Conferences between the authorities of Norwich, Great Yarmouth, and Lowestoft are to be called to further consider the question of the bulk supplies between the towns.

Faversham.—APPLICATION FOR LOAN.—The Town Council has decided to apply to the Electricity Commissioners for a loan of £2,822 for mains renewals.

NEW PLANT.—The new plant at the electricity works, which includes two Browett-Lindley engines, a balancer and dynamo, an oil purifier, and water-cooling plant, was formally inaugurated by the mayor on July 8th.

Grange.—ELECTRICITY IN BULK.—The Urban Council having sealed agreements for a supply of electricity in bulk from Barrow-in-Furness, has issued instructions for the preparation of a distribution scheme for approval so that tenders may be in hand immediately sanction to the scheme is obtained.

Hastings.—STREET LIGHTING.—The Town Council is to convert the remaining street gas lamps to electricity, and is applying for sanction to a loan of £17,850 for the necessary mains.

Huddersfield and Halifax.—Y. E. P. PROPOSAL.—The Yorkshire Electric Power Co. has intimated to the Huddersfield and Halifax Corporations that unnecessary expenditure in connection with the proposal to lay h.p. mains to connect the electricity undertakings of the two towns may be avoided by utilising the company's mains.

Hull.—YEAR'S WORKING.—In the accounts for the 32nd year's working of the Kingston-upon-Hull electricity undertaking (engineer: Mr. H. Bell), the total revenue is shown as £312,694, against £295,732 for the year 1923-24. The working expenses amounted to £183,079, against £163,727, leaving a gross profit of £129,615 (£132,005). After deducting the capital charges, the net surplus is £29,347, against £59,685 for the previous year. The total capital expenditure at the end of the year stood at considerably over £1,400,000. The kWh generated amounted to over 60 million.

India.—ELECTRICAL DEVELOPMENT IN MUSSOORIE.—There is a proposal to extend the supply of electrical energy in the important hill station of Mussoorie in the United Provinces at a cost of rupees 10 lacs. The municipal hydro-electric undertaking has reached the limit of its capacity and the demands for industrial and other purposes are increasing. Sources of further supply were recently examined by a committee of experts, which decided on the erection of an installation at Dehra Dun, using Diesel engines, linked with the hydro-electric undertaking of the Mussoorie Municipality.

EXTENSIONS IN CALCUTTA.—Electrical extensions are being carried out in Calcutta. The power house of the Gourpore Jute Mill is one of the biggest in Bengal, and it is now proposed to supply the towns of Hooghly Chinsurah, Chandernagar, and Serampore with electricity from this power house for lighting purposes. Under this project, the East Indian Electric Supply & Traction Co. will take its supply in bulk from the jute mill and link up Gourpore and the other towns. The Gourpore Jute Mill power house has five generators with a total capacity of 12,400 kW. The system is a.c., 6,600 V, 50-cycles.

CAUVERY FALLS SCHEME.—Sir Albion Banerji, the Dewan of Mysore, has announced the scheme for a seventh installation at the Cauvery Falls. The estimated cost of additional plant and the distribution of the extra 14,000 h.p. is Rs. 34,37,254. It is proposed to finance this scheme from the general capital resources without recourse to public borrowing, and the grant allowed for this in the next year is Rs. 20 lacs.

Ipswich.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. A. S. Black) for the year ended March 31st show a total income of £97,170, as compared with £87,867 in 1923-24. The working expenditure amounted to £57,340, as against £50,507, leaving a gross surplus of £39,830 (£37,360). After deducting capital charges there was a net profit of £28,025, as against £26,610. The capital expenditure amounted to £37,800, the chief items being £16,154 for machinery and £13,456 for mains. The sales of electrical energy increased by 14.7 per cent. to 7,835,309 kWh, and the maximum supply demanded rose from 4,844 to 5,150 kW. During the year an order was placed for a 5,000-kW Brush-Ljungström turbo-alternator, which it is hoped to put in commission for next winter's load.

Kendal.—BATTERY INSTALLATION.—The Town Council has decided to install at the electricity works a battery as an auxiliary to the present plant, at an estimated cost of £6,000. This is in consequence of the failure of negotiations to secure a supply of electricity in bulk from a local firm.

Kirkcaldy.—YEAR'S WORKING.—The report of the burgh electrical engineer (Mr. O. F. Francis) on the working of the electricity undertaking for the year ended May 15th last shows a total revenue of £43,650, and working expenses of £26,089, leaving a gross profit of £17,561. In the previous year the income was £35,986, working expenses £23,050, and gross profit £12,936. After allowing for interest and other charges, there was a net surplus of £812, as against £2,485 in 1923-24. The electrical energy sold increased from 4,581,030 to 6,076,063 kWh, and the average price per kWh obtained fell from 1.88d. to 1.71d. The maximum supply demanded rose from 2,040 to 2,600 kW.

Korea. — HYDRO-ELECTRIC DEVELOPMENT. — According to *Eastern Engineering*, an application has been filed with the South Kamkyo provincial office, Korea, by several Japanese business men for permission to organise a company to generate electricity by means of the water of the Choshin and Fusen rivers, and undertake electro-chemical industry. The plan is to generate 217,070 kW by means of the River Choshin and 130,156 kW by means of the River Fusen, the electricity thus produced being supplied to the five provinces of South Kankyo, North Kankyo, Kogen, Keiki, and South Heian. Four hydro-electric power stations will be established on the Choshin and four on the Fusen, while transformer stations will be erected at various sites. The proposed company is to be capitalised at 200 million yen, and contemplates the establishment of an electro-chemical factory at a cost of 13 million yen.

Lincoln.—YEAR'S WORKING.—The report of Mr. S. Clegg, city electrical engineer, on the working of the electricity undertaking for the year ended March 31st last records a total revenue of £83,602, as compared with £76,752 in 1923-24. Working expenses were greater by £4,584 at £40,279, and the gross profit was £43,323 (£41,056). After deducting capital charges, there was a net surplus of £7,955, as compared with £6,186 in the previous year. The capital expenditure during the year amounted to £24,200, the chief item being £13,043 for mains and services. The electrical energy sold amounted to 16,388,362 kWh, an increase of 10.8 per cent., and the maximum supply demanded rose from 6,500 to 7,050 kW.

Lowestoft.—APPLICATION FOR LOAN.—The Electricity Committee is to seek sanction for a loan of £3,300 for the provision of a feeder cable to Oulton Broad.

Leeds.—PREMISES PURCHASED.—The Electricity Committee has purchased 28 and 29, Acre Street, for electricity purposes, at a cost of £12,000.

London.—POPLAR.—The report on the working of the borough electricity undertaking (engineer: Mr. J. H. Bowden) for the year ended March 31st last records a total revenue of £204,240, as compared with £139,270 in 1923-24. The working expenditure increased by £1,841 to £115,851, leaving a gross profit of £88,390 (£75,260), to which was added revenue from other sources, making a total of £90,933. After deducting capital charges, there was a net surplus of £30,977, as compared with £20,404 in the preceding year. The capital expenditure during the year amounted to £80,774, and the amount now spent on the undertaking stands at £958,480. The sales of electrical energy increased from 29,579,434 to 32,537,196 kWh, and the average price per kWh obtained fell from 1.53d. to 1.50d. The maximum supply demanded rose from 13,200 to 14,200 kW.

Maidenhead.—APPLICATION FOR LOANS.—The Town Council has applied to the Electricity Commissioners for loans of £5,000 for mains and services, and £3,500 in respect of the cost of the first section of converting equipment and alterations to the boiler room in connection with the bulk supply of electricity.

Marlborough.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £2,425 for electricity purposes.

North Wales.—WATER-POWER DEVELOPMENT.—According to *The Times Trade and Engineering Supplement*, rapid progress is being made with the new hydro-electric works of the North Wales Power Co. The new pipe line at Dolgarrog is completed and undergoing test before being taken over, while the work on the series of lakes to provide additional water has been advanced. The building of a new dam at Maentwrog for a new power station is well under way and a tunnel is also to be constructed to connect the two lakes. Meanwhile the construction of the overhead cables is making rapid progress, and the main cable lines to supply the London, Midland and Scottish Railway works at Crewe are approaching that centre.

Newcastle-under-Lyme.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. A. J. C. De Renzi) for the year ended March 31st last show a total revenue of £12,147, as compared with £10,306 in the preceding year. Working expenses were £6,359, as against £5,208, leaving a gross profit of £5,788 (£5,098). After deducting capital charges, a net profit of £1,220 remained, as compared with a surplus of £705 in 1923-24. The sales of electrical energy increased from 462,106 to 824,688 kWh.

Northern Ireland.—AUGHNACLOY (CO. TYRONE).—The Town Council is to consider at its next meeting a proposal to light the town by electricity.

RATHFRILAND (CO. DOWN).—The ratepayers recently met to consider the question of adopting a system of electric lighting for the town. The question arose in consequence of an application to the Newry No. 1 Rural District Council for permission to erect poles and supply electricity. It was resolved, with one dissentient, to recommend the District Council to grant facilities for the electric lighting of the town.

Canada.—HYDRO-ELECTRIC DEVELOPMENT.—The Ontario Government has authorised the Hydro-Electric Power Commission to develop power on the Ottawa River to meet the demands of the southern portion of the province. The Order in Council specifies five different sites as offering possibilities of successful power development.

Penmaenmawr.—INAUGURATION OF SUPPLY.—The electricity supply for the district was inaugurated by the chairman of the Urban Council on July 7th. The charges are 8d. per kWh for lighting and 3d. per kWh for power. Electricity is obtained in bulk from the North Wales Power Co. The Electricity Committee has recommended that electricity be adopted for street lighting, at an estimated cost of £1,327.

Peterborough.—YEAR'S WORKING.—The report on the working of the city electricity undertaking (engineer: Mr. H. A. Nevill) for the year ended March 31st last shows a total income of £53,876, and working expenditure of £26,716, leaving a gross profit of £27,160. The previous year's figures were:—Income, £40,371; expenditure, £20,985; gross profit, £19,386. After deducting capital charges, and capital outlay charged to revenue, a surplus of £246 was carried forward. The previous year's working resulted in a deficit of £5,664. The electrical energy sold increased from 4,273,955 to 6,817,669 kWh, and the maximum supply demanded from 2,800 to 3,400 kW.

Plymouth.—MAINS EXTENSIONS.—The Electricity Committee has authorised cable extensions at a cost of £2,491.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

NEWCASTLE-UNDER-LYME.—Lighting: Flat rate, 7d. per kWh; alternative rate for basement premises, £8 per kW per annum, plus 2d. per kWh; slot meters, 8d. per kWh. Power: Flat rate—first 200 kWh per quarter, 3½d. per kWh; all energy in excess, 3d. per kWh. Maximum demand system: Consumers with motors totalling more than 20 h.p., £5 per kW, plus 1d. per kWh. Heating and domestic purposes: Flat rate of 2d. per kWh, with a minimum charge of 10s. per quarter for the winter quarters, and 5s. for the summer quarters.

BURTON-ON-TRENT.—Lighting: From 6½d. to 6d. per kWh. Power: From 60 to 50 per cent. above the pre-war rate.

GLASGOW.—Except for domestic lighting, the charges have been reduced by ½d. per kWh.

HECKMONDWIKE.—Lighting: Reduced by 1d. to 6d. per kWh.

WORCESTER.—Lighting: Flat rate, from 6½d. to 6d. per kWh. Power, theatres and kinemas: The percentage increase reduced from 40 to 30. All charges subject to a discount of 10 per cent. for prompt payment of accounts.

Retford.—ELECTRICITY SUPPLY.—The Town Council has resolved to proceed with a scheme for generating its own electricity in conjunction with the gas undertaking. Two schemes have been prepared by Mr. H. Seabrook, one costing £10,050 and the other £17,200. It is anticipated that the station will be in operation by June, 1926.

Ross.—STREET LIGHTING.—The Urban District Council is asking the local Gas Company and Electric Light Co. to submit tenders for the lighting of its area.

Sheffield.—ELECTRICITY EXTENSIONS.—The Electricity Committee has approved extensions of works at an estimated cost of £7,446 and extensions of mains for general distribution purposes at an estimated cost of £11,179.

PURCHASE OF UNDERTAKING.—The Yorkshire Electric Power Co. and the Sheffield Corporation have agreed to appoint Mr. W. H. Patchell, consulting engineer, of London, as sole arbitrator, to settle the amount of the purchase money to be paid by the Corporation for the purchase of the undertaking of the company in the area of Wadsley.

Silsden.—ELECTRICITY SUPPLY.—The Urban District Council has entered into negotiations with the Keighley Corporation with a view to a supply of electricity being obtained for the district.

Sleaford.—NEW PLANT.—The Urban District Council is to install two oil engines at the electricity works with accessories, at an estimated cost of £8,207, and application is to be made for sanction to a loan to cover the expenditure.

Southport.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. E. Moxon) for the year ended March 31st last record a total revenue of £89,339, as compared with £84,076 in the preceding year. Working expenses were £42,550, as against £37,209, leaving a gross profit of £46,789 (£46,867). Capital charges absorbed £28,134, and there was a net profit of £18,656, as compared with £18,225 in 1923-24. The amount spent on capital account was £24,433, and included £13,902 for mains and services. The sales of electrical energy increased from 5,514,115 to 6,018,541 kWh, and the maximum supply demanded from 3,152 to 3,681 kW. The extension of the boiler plant was commenced during the year, and it is hoped to have the work completed in time for next winter's load. The Birkdale District Electric Supply Co., Ltd., commenced taking a bulk supply in January last.

Special Orders.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation, Special Orders made by them for the supply of electricity in the following districts: The urban districts of Sutton-in-Ashfield, Huthwaite and Kirby-in-Ashfield, and parts of the rural districts of Basford and Skegley, by the Derbyshire and Notts. Electric Power Co.; the urban district of Grange by the Council; the urban district of Ashford and the rural district of West Ashfield, by the Urban District Council; in various parts of the County of Renfrewshire, by the Strathclyde Electricity Supply Co., Ltd.

Application has been made by the Urban District Council of Portmadoc for an Order to supply electricity in its area.

Application is being made by the Corporation of Gloucester to supply electricity within the Rural District of Gloucester; the Corporation of Birmingham to supply electricity within the Rural District of Solihull and part of the Rural District of Meriden; the Southern Counties Electric Light and Power Supply, Ltd., to supply electricity within the Rural District of Sturminster, Dorset.

Stockton.—ASSISTED WIRING SCHEMES.—The Town Council has issued instructions for assisted wiring schemes for private houses to be put into operation.

MAINS EXTENSIONS.—The Electricity Committee has approved of the proposal to lay a high-pressure main from the works to the Durham Road area, and erect a small outdoor sub-station at an estimated cost of £5,500. The manager is to report again when anticipated developments take place.

Sunderland.—STREET LIGHTING.—The Corporation has received sanction to a loan of £100,000 for mains in connection with the conversion of the street lamps from gas to electricity.

Thrapston.—OPPOSITION TO SCHEME WITHDRAWN.—The Rural District Council has consented to the application of the Rushden and District Electric Supply Co., Ltd., for permission to use overhead h.p. and l.p. mains in the Council's area. The Council had previously declined to consent to the use of overhead lines.

Tunbridge Wells.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £6,500 for extensions to the electricity works.

Walsall.—YEAR'S WORKING.—The accounts of the electricity undertaking (engineer: Mr. H. A. Howie) for the year ended March 31st, 1925, record a total revenue of £100,151, against £92,744 for the preceding year. The working expenditure amounted to £53,955, against £43,228, leaving a gross profit of £46,196 (£49,516). The deduction of capital charges leaves a net profit of £14,830, as compared with £18,824 for the year 1923-4. The capital expenditure during the year amounted to £40,027, making a total of £429,167. The sales of electrical energy increased from 12,087,881 to 13,953,947 kWh, and the average price per kWh decreased from 1.84d. to 1.72d. The maximum supply demand for the year was 5,700 kW, representing an increase of 500 kW.

Watford.—APPLICATION FOR LOAN.—The Town Council has applied to the Electricity Commissioners for loans amounting to £55,550 for additional plant at the electricity works.

Wimbledon.—YEAR'S WORKING.—We have received from Mr. A. E. McKenzie, borough electrical engineer, a copy of his report on the working of the electricity undertaking for the year ended March 31st last. The revenue account shows a total income of £116,147, as compared with £107,825 in the preceding year. The working expenditure was £61,012, as against £50,625, leaving a gross profit of £55,134 (£57,201). Capital charges, &c., absorbed £31,587, and there was a net surplus of £23,971, as compared with £20,408 in 1923-24. A total of £75,857 was spent on capital account during the year; this included £31,145 for machinery and £25,947 for mains and services. The total sales of electrical energy increased from 8,570,130 to 11,010,062 kWh, and the average price obtained per kWh fell from 2.882d. to 2.281d. The second 3,000-kW turbo-alternator was installed during the year, and an order was placed for a new 50,000-lb. boiler and economiser.

Woolwich.—ELECTRICITY EXTENSIONS.—The Town Council has adopted a recommendation to carry out extensions to the electricity works, at an estimated cost of £110,000.

Worcester.—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking (engineer: Mr. C. M. Shaw) for the year ended March 31st last shows a total revenue of £57,543, as compared with £45,867 in the preceding year. Working expenses amounted to £32,299, as against £27,490, leaving a gross profit of £25,243 (£18,377). After allowing for capital charges, there was a net surplus of £7,581, as compared with £2,714 in 1923-24. During the year £26,377 was spent on capital account, and included £18,780 for mains and services. The electrical energy sold amounted to 6,942,757 kWh, an increase of 742,574 kWh, and the maximum supply demanded rose from 4,214 to 4,443 kW.

EXTENSION OF SUPPLY.—The Electricity Committee has recommended to the City Council that applications be made for

sanction to a loan of £33,000 to cover the cost of extending the electricity supply in an area of about 33 square miles, a Special Order for which has already been obtained. The engineer, Mr. Shaw has suggested that the greater part of the transmission and distribution should be carried out on the overhead system.

Worksop.—ELECTRICITY SUPPLY.—The Urban District Council has decided to extend its existing power station and is therefore abandoning negotiations for a bulk supply of electricity from Rotherham Corporation.

Tramway and Railway Notes.

Continental.—SWEDEN.—Work is well in hand on the electrification of the Stockholm-Gothenburg section of the Swedish State Railways, and it is expected that the whole line, a distance of about 286 miles, will be completed by the end of the present year. Single-phase current at a frequency of 16 2/3 cycles and 16,000 V is being used, the energy being taken from the State-owned system of main three-phase transmission lines at various sub-stations. The three-phase lines have pressures varying from 50,000 to 130,000 V, which will be transformed down to 6,000 V. The single-phase energy will be generated at 3,000 V and stepped up to 16,000 V. Of the 50 electric locomotives ordered, 10 will be allotted for passenger and 40 for goods service. The cost of the electrification work on the line is estimated at about £2,149,000, including £578,500 for the necessary locomotives, while the power consumption is estimated at 50 million kWh per year.

BELGIUM.—A new electric tramway is approaching completion between the Central railway station in Antwerp and Dam.

The Société des Tramways Electriques du Pays de Charleroi has applied for a concession for an extension of its electric tramways to provide a connection between the railway station at Couillet-Montignies and Chatelet.

Chesterfield.—RAILLESS CARS.—The Town Council has decided to adopt a railless-car system in place of the present tramway system, but has postponed the beginning of the work for twelve months. The tender for the conversion of the overhead equipment and the supply of 14 vehicles was £27,548.

Hull.—YEAR'S WORKING.—The report on the working of the Corporation tramway undertaking (general manager: Mr. E. S. Rayner) for the year ended March 31st last shows a total income of £326,549, as compared with £328,698 in 1923-24. Working expenses totalled £255,986, as against £236,288, leaving a gross profit of £70,563 (£93,773), to which was added interest from various sources, and a grant of £1,050 from the Unemployment Grants Committee, making a total of £74,293. This was dealt with as follows:—Interest, £20,918; loan instalments, £17,383; annual contribution in respect of cost of widening streets on tramway routes, £2,981; income tax, £9,978; borough fund, £12,000; deficit on motor-omnibuses, £4,777; reserve fund, £6,255. During the year £75,991 was spent on capital account, the chief item being £64,266 on permanent-way. The number of passengers carried increased from 60,316,860 to 62,387,677, and the car-miles run from 4,529,379 to 4,570,277.

Irish Free State.—DUBLIN.—The offer of the Dublin United (Electric) Tramway Co., Ltd., to take over the recently-closed Dublin and Lucan Tramway has been considered by the Dublin City Commissioners. While they are favourable to the proposal, the Commissioners state that they cannot undertake the responsibility of postponing for 42 years the date upon which the tramway may be acquired by the Corporation. With regard to the supply of electricity by the late Dublin and Lucan Tramway Co., the Commissioners say that this supply was non-statutory, but they are willing to agree to its continuance, it being understood that this in no way prejudices the Corporation's rights in the event of an extension of the city boundaries.

London.—SOUTHWARK BRIDGE EXTENSION.—The extension of the L.C.C. tramway across Southwark Bridge was opened by the Lord Mayor of London, Sir Alfred Bower, on Tuesday last. The extension has cost nearly £56,000.

Lostock Light Railway.—EXTENSION OF TIME.—The Minister of Transport has extended the time for the completion of Lostock Light Railway by 12 months until June, 1926.

Liverpool.—YEAR'S WORKING.—We have received from Mr. P. Priestley, general manager of the city tramway undertaking, a copy of his report, together with the accounts for the year ended March 31st last. The total revenue amounted to £1,337,805, as compared with £1,394,386 in 1923-24, the falling off in receipts being due to the reduction of fares during the latter part of 1923. The working expenditure was £1,142,975, as against £1,063,324, leaving a gross surplus of £194,830 (£331,062), to which was added interest from various sources, and a contribution from the Unemployment Grants Committee, making a total of £217,791. After deducting capital charges, a surplus of £119,111 was carried to reserve, renewal and depreciation account. The previous year's working resulted in a profit of £240,427. The capital expenditure during the year amounted to £197,510, and included £105,889 for permanent-way reconstruction, £44,660 for cars, and £27,310 for land, buildings, and fixtures. The number of passengers carried increased by 27,235,955 to 234,906,356, and constitutes a record for the undertaking. The car-miles run increased from 15,731,411 to 16,789,321. During the year four new routes were opened for traffic, and Orders have been obtained to construct tramways along five additional routes. About 26 miles of trolley wire has been renewed, and 15 miles erected in connection with extensions, &c.

Northampton.—YEAR'S WORKING.—The accounts of the Corporation tramway undertaking (general manager: Mr. J. F. Cameron) for the year ended March 31st last records a total revenue of £83,596, as compared with £80,287 in the preceding year. Working expenses totalled £59,504, as against £54,231, leaving a gross profit of £24,091 (£26,056), to which were added contributions from the Museum and Education Committees, making a total of £24,418. After providing for capital charges there was a net surplus of £13,172, as compared with £15,053 in 1923-24. The number of passengers carried increased from 12,121,947 to 13,163,318, and the car-miles run from 822,141 to 841,840.

Sheffield.—NEW TRAMCARS.—The Finance Committee of the City Council has approved the purchase of 50 new tramcars.

Southern Railway. — ELECTRIFICATION EXTENSIONS. — On Thursday, July 9th, the electrification of the line from Waterloo to Guildford, was officially inaugurated; and on Sunday, July 12th, three branches of the South-Eastern sections of the suburban lines, Victoria and Holborn Viaduct to Orpington, St. Paul's to Shortlands *via* Catford), and St. Paul's to the Crystal Palace (high level), were run electrically for the first time. These extensions amount to nearly 200 track miles. There were a few minor breakdowns and a certain amount of delay on July 13th, the first full-traffic day.

Telegraph and Telephone Notes.

China.—TELEPHONE PROGRESS.—The Chekiang authorities have decided to set up a long-distance telephone service between Ningpo and Hangchow (Chekiang provincial capital); to save expense the wires are to be strung on telegraph posts. The long-distance telephone service between Tsingtao and Tsinan (Shantung provincial capital) has been opened. The successful operation of a long-distance service between Canton and Fatshan has caused the military authorities at Kongmoon to request similar lines for five West River districts which centre about Kongmoon; the line to be built first will be to Sunchong. A public telephone service between Hunchun and Hsiaosanch'ak'ou (Kirin province) has been established.

RADIO STATIONS.—A commercial "wireless" company is being formed in Canton; all stations at present at Canton, or in the vicinity, are controlled by the Government. The Tientsin station, built under the auspices of the Tientsin Telephone Administration for commercial purposes, has inaugurated its service; the wavelength is 1,000 metres.—*Eastern Engineering.*

Japan.—OSAKA TELEPHONES.—The Osaka Bureau of Communications has decided on the number of telephones to be installed in the eight prefectures under its jurisdiction in the new financial year. The telephones installed in the district last fiscal year were but 530; in the current year the number has, however, been increased to 3,300. Consideration has been given to the towns and suburban districts, where the price of the instrument is high. High prices rule in Ashiya, Mikage, Tengachaya, Sumiyoshi, &c., and in these places from eight to ten times more telephones than last year have been allocated, so as to regulate the market price. The actual expenses to be contributed to the Bureau by applicants for the installation of telephones are still kept strictly secret, but it is understood that in a place where the charge was 550 yen last year it will put up to 800 yen, &c.—*Eastern Engineering.*

South Africa.—RADIO COMMUNICATION.—In the course of a debate in the House of Assembly on the Post Office vote on July 6th, Mr. Boydell, Minister of Posts and Telegraphs and Public Works, stated that he anticipated that beam radio stations in South Africa and England would be ready for operation about November. The Union, he added, would be represented on the Committee in England for fixing rates for the Dominions' wireless services.—*Reuter* (Cape Town).

Sweden.—RADIO TELEGRAPHY.—The Grimeton radio station on the west coast of Sweden, which was put into operation a few months ago, appears to have gained the support of the public; 95 per cent. of the Swedish telegraph messages to the United States are transmitted by Grimeton, while it receives about 40 per cent. of the Swedish telegrams from that country. The new station is handicapped on the American side by the fact that the cable company has stations all over the States, which do not accept telegrams for transmission by "wireless." Nevertheless, there is a notable increase of messages carried in this direction also. According to *Swedish Export*, the new service has reduced the rates of the cable companies

to 33 per cent. below pre-war charges, while the installation and operating costs have turned out lower than estimated, and the business has been larger than was hoped for. The authorities at no time reckoned with more than 2 per cent. on the investment.

The Telephone Service.—ADDITIONAL TRUNK LINES.—The Postmaster-General announces that additional trunk telephone lines are now available for communication between London and Glasgow.

GLASGOW AUTOMATICS.—The Glasgow Corporation proposes to replace the present telephone system in the City Chambers by an automatic system with provision for "dialling" direct to the central exchange.

Telegraph Developments.—PRESS UNION STATEMENTS.—At a recent meeting of the Empire Press Union Sir Robert Donald is reported to have said that wireless telegraphy—and possibly even radio telephony—would be operative between England and the Dominions within about eight months. Sir John Denison-Pender, president of the Eastern Telegraph Co., detailed the work of his company since the war, involving the expenditure of £10,500,000 on new cables and the repair of old lines. Mr. Goddard, representing the Western Union Telegraph Co. of America, indicated that their latest development in cable improvements would practically amount to an eight-fold increased carrying capacity. Sir John Denison-Pender said that additional capacity provided to deal with the "rush" hours left them with a margin of capacity during non-rush hours, which had been utilised by the introduction of a new class of traffic at quarter rates—daily letter telegrams, subject to delivery after 48 hours—which had provided a new source of revenue. His company had decided to lay a loaded cable between Perth (Western Australia) and Cocos Island, and it was estimated that they should be able to get a capacity of over 2,000 letters per minute in one direction, as against 600 letters per minute with an unloaded cable. On his company's system the Press messages amounted in words to 22 per cent. of their total traffic, while the revenue from those messages was only two per cent. of the total receipts. Sir Campbell Stuart, member of the Pacific Cable Board, announced that from July 7th the Press rate for messages by the Pacific cable route would be reduced from 7½d. to 6d. per word.

Turkey.—NEW RADIO STATIONS.—The Post Office has concluded an agreement with a French company for the installation of radio transmission and reception stations at Angora and Constantinople, the work to be completed in one year.—*Reuter* (Constantinople).

TELEGRAPH OPERATORS' STRIKE.—A simultaneous strike on the part of telegraph operators at Adana, Erzeroum, and Samsoun, which crippled the communications between these places and the interior, led the Government to take strong action against the strikers. or, although the alleged motive of their action was the obtaining of an increase of salary, the authorities believed that the simultaneous outbreak of the strike was prompted by Communists. The ringleaders have been arrested and dispatched under escort to Angora, where they will be tried.—*Reuter* (Constantinople).

Radio Notes.

Australia.—LABOUR COUNCIL'S STATION.—The Postal Department has decided to grant the application of the New South Wales Labour Council for a licence to establish a broadcasting station, and has allotted the proposed station a wave-length of 280 metres. The secretary of the Postal Department, Mr. H. P. Brown, has stated that the Council has undertaken to conduct the station in accordance with the regulations and not to commit any breach of the Telephone Act by using it for the transmission of information which, legally, can be transferred only by the Postmaster-General.

Germany.—It is reported that the broadcasting station at Munich increased its transmitting power on July 15th from approximately 1 to 10 kW, and it is practically certain, says the *Evening News*, that the other German stations will similarly increase their power in the near future.

Hospital Equipment.—The Colchester Board of Guardians has decided to install a broadcast receiving set in the Workhouse Infirmary for the benefit of the patients. Maidstone Rotarians are to equip two local hospitals with receiving apparatus.

International Radio Conference.—GENEVA MEETING.—Representatives of France, Great Britain, Italy, Germany, Sweden, Switzerland, and Czecho-Slovakia took part in the above Conference, which opened at Geneva on July 6th. Great Britain was represented by Admiral Carpendale, president of the International Wireless Union, and Captain Eckersley, chief engineer to the British Broadcasting Co. Captain Eckersley presented a memorandum on the redistribution of the wave-lengths employed in Europe, and a sub-commission of seven members was appointed to draw up a scheme. He was elected president of the Conference, which concluded its labours on July 8th. Certain changes have been decided upon, but the necessity of keeping the older and more important stations on their present wave-lengths has been constantly kept in view. A fresh scheme for the distribution of wave-lengths was drawn up; on or about September 1st, certain transmitting stations in Europe will change their wave-lengths, and an experiment will be made in transmission after the hours of regular broadcasting so as to test the new scheme. A second trial will take place a fortnight later, and the results obtained will serve as a basis for the final discussion, which will take place in Geneva.

The Council of the International Wireless Telephony Union, sitting on July 9th, ratified the decisions reached during the Conference, and agreed to approach the various European Governments, through the Communications and Transit Section of the League of Nations, for permission to conduct experiments early in September. In the event of such permission being granted, a further conference of technical experts will be held at Geneva on September 21st and 22nd to examine the data collected by the office of International Wireless Telephony as a result of the experiment. In order that the decisions then made may be put into effect with the minimum of delay, the Council of the Union will assemble again on September 23rd and 24th.—*Reuter* (Geneva).

Musical Committee.—ADVISORY BODY.—A Musical Committee has been appointed by the British Broadcasting Co. to advise on the musical programmes to be broadcast, with a view to associating still more closely the work of the company with the musical profession.

The B.B. Co.—YEAR'S WORKING.—The accounts of the British Broadcasting Co. for the year ended March 31st last show that the excess of revenue over expenditure was £84,138, as compared with £8,812 a year ago. The maximum dividend of 7½ per cent. is recommended, and the balance of £79,685, against £723, is carried forward. During the year licence fees to the amount of £488,881 were received; the proportion of the tariffs received to date and allocated to the past year was £35,688, while sundry revenue, including the profit on the *Radio Times*, was £13,958. The cost of the programmes and operating and administration expenses totalled £414,199.

United States.—WAVE-BAND INCREASE.—While European broadcasting authorities are discussing wave-lengths with a view to a proper allocation between various countries, the U.S.A. have evolved a scheme to overcome similar difficulties of their own. The plan is to broaden the present band (300 to 546) to between 150 and 546 metres. The proposal will provide accommodation for 600 stations, allowing room for 40 more in addition to the present number. The idea is to separate the broadcasting stations by grouping the high- and low-power stations in different sections of the band.

Contracts Open and Closed.

(The date given in parentheses at the end of the paragraph indicates the issue of the "Electrical Review" in which the "Official Notice" appeared in our advertisement pages.)

Open.

Australia.—SYDNEY.—July 27th. Municipal Council. One 5,000-kVA, 5,000/33,000-V step-up transformer; supply of gas-filled lamps. Specifications from the office of the Construction Engineer, Electricity Department, Town Hall, Sydney.

Postmaster-General's Department.—Automatic c.b. telephone exchange equipment, Canberra exchange.

New South Wales Public Works Department. September 14th. Electrical equipment, machinery, &c., for bascule bridge over Cook's River at General Holmes' Drive.*

September 21st. Material and apparatus for complete communication system, Barrenjack hydro-electric scheme.

MELBOURNE.—August 3rd. Electricity Commission of Victoria. Switchgear and accessories.

September 14th. 3,000-kVA transformers and spares. Particulars from the Purchasing Section of the Commission, William Street, Melbourne.

Postmaster-General's Department. August 11th. (Sched. C. 26), plugs and sleeves (switchboard). (Sched. C. 25), switchboard cords.

September 15th. Lamps, lamp caps, and lamp sockets. Tender forms from High Commissioner, London.

Barking.—July 28th. Electricity and Tramways Department. One 1,000-kW and one 500-kW rotary converters, with oil-cooled transformers and synchronising panels or, alternatively, one 1,000-kW and one 500-kW motor-converters (La Cour type), with starting and synchronising panels, e.h.p. switchboard, 3-wire d.c. switchboard and traction board. (July 10th.)

Belgium.—June 22nd. Belgian State Railway authorities (Office de l'Electricité), 25, Rue de la Charité, Brussels. Two lots of 160,000 metres of electric wire and four lots, totalling 110,000 metres, of specially-insulated wire. Particulars (Cahier des Charges Special No. 4-257), for 1 fr.

July 29th. Belgian Post and Telegraph authorities at La Salle Madeleine, Brussels. Thirty-eight lots of miscellaneous telephone material, including tables, jacks, 5,000 hand telephones, 100 voltmeters, and 5 000 condensers. Particulars on application to Cahier des Charges Special No. 3-126.

Bristol.—August 10th. Docks Committee. Four 3-ton movable electric jib wharf cranes for the Royal Edward Dock, Avonmouth. Spec. (£3) from Mr. T. A. Peace, chief engineer, Avonmouth Docks.

(Continued on page 103.)

SINCE
tric P
West I
in 190
useful
undert

guidi
cal su
scale
organ
super
gener
and t
tem o
of 1,8
of ov
the n
this c
the n
coalfi
ments
suppl
38 pe
put.
textil
spinn
ally
necte
1905,
comp
textil
electr
cular
electr
One
in th
h.p.
main
chase
produ

In
quire
dome
are c
assoc
Distr
many
cular

Electricity Supply in Yorkshire.

The Yorkshire Electric Power Co.'s Development and Station Extensions.

SINCE it is now almost 21 years since the Yorkshire Electric Power Co. commenced to supply electricity in the West Riding, having obtained its Parliamentary powers in 1901, a brief record of its achievements will serve a useful purpose, particularly as the magnitude of the undertaking is not generally realised. The fundamental

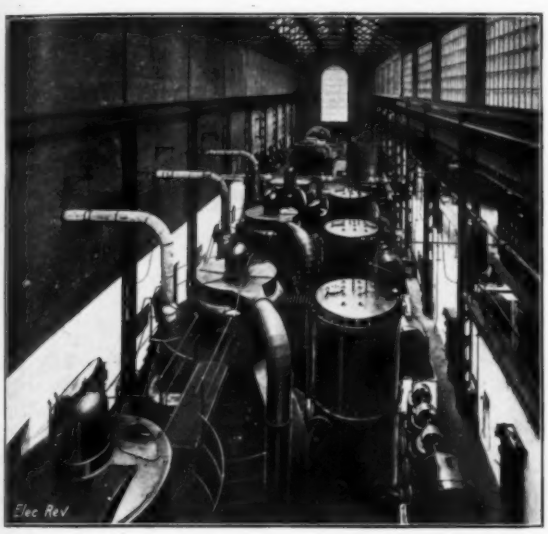


Fig. 1.—Original B.T.-H. Vertical Turbo-generators.

guiding principles have been the facts that the economical supply of electricity involves production on a large scale and distribution for all purposes by a single organisation over a wide area, the superseding of small inefficient generating stations, coal economy, and the standardisation of the system of supply. The company's area of 1,800 sq. miles, with a population of over 3,000,000 people, is one of the most industrialised districts of this country, and it includes one of the most important of the English coalfields, in which great developments are taking place; colliery supplies of electricity represent 38 per cent. of the Y.E.P. Co.'s output. Yorkshire is the seat of the textile industry. The first worsted-spinning mill to be driven electrically from a public supply was connected to the Y.E.P. Co.'s mains in 1905, and to-day 16 per cent. of the company's output is utilised in textile mills. In the steel trade the electric drive has proved to be particularly suitable, while the merits of electric furnaces need no emphasis. One of the largest steel-rolling mills in the world is driven by a 19,000-h.p. motor, fed from the company's mains. General power users purchase 26 per cent. of the electricity produced by the company.

In addition to meeting the requirements of diverse industries, the domestic needs of a large population are catered for by the Y.E.P. Co.'s associated organisation, Electrical Distribution of Yorkshire, Ltd. Since the war many housing schemes have been completed, particularly in the coalfield, where entirely new villages have been built, the houses being supplied with electricity and the new streets electrically lighted. In all 70 distributing undertakings operate in the Y.E.P. Co.'s area, the availability of bulk supplies having enabled many of them to carry out their work without the necessity of building generating stations; in fact, those

Fig. 2.—Thornhill Power Station, June, 1925.

which had previously established generating plant have dispensed with it, with consequent economy. About 20 per cent. of the electricity produced by the company is disposed of in bulk, but it nevertheless supplies consumers direct in many cases. To do so in every case (as the company would prefer) is not, however, permitted owing to the form which legislation took in the past; the establishment of E.D. of Y., Ltd., was therefore a necessary step towards development, and the close co-operation of the two organisations has made electricity available in scattered districts which would otherwise be without it.

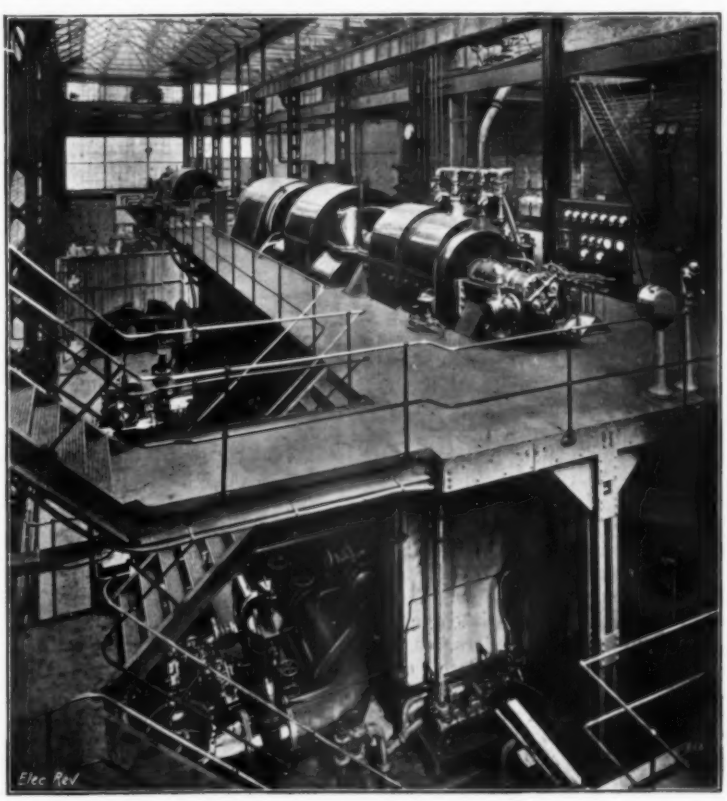


Fig. 3.—Thornhill Turbine Room, June, 1925.

The original steam generating station at Thornhill commenced to supply electricity to a colliery in December, 1904. The station originally contained three

1,500-kW, 1,000-r.p.m. British Thomson-Houston vertical turbo-alternators, fig. 1, with surface condensers and Edwards air pumps. The alternators generated three-phase current at a terminal pressure of 11,000 volts and a frequency of 50 cycles per second; 20 years ago it was somewhat unusual to find stations generating at such a high voltage, and the frequency then adopted by the company has since become the national standard. This original part of the station still exists, and now forms the centre block, and with the addition of a fourth British Thomson-Houston vertical turbo-alternator is now only used for stand-by purposes.

The station was gradually extended until in 1915 the urgent demands for electric power for munition making purposes called for the addition of two 6,000-kW British Thomson-Houston turbo-alternators, running at 1,500 r.p.m. and generating three-phase current at 11,000 volts, with surface condensers and steam-jet air pumps by Hick, Hargreaves & Co.

A second boiler house (No. 2) was built adjoining the turbine house extension. It contains at present three Stirling water-tube boilers, each having a normal evaporation of 39,000 lb. of water per hour, and two larger Stirling boilers of the tri-drum type, each having a normal evaporation of 50,000 lb., with Green horizontal tri-tube economisers. The working pressure is 200 lb. per sq. in., and superheaters raise its temperature from 382 to 600 deg. F. The boilers are fitted with chain-grate mechanical stokers and induced-draught

Fig. 4.—One of the Thornhill Boiler Houses.

plant. A further 50,000-lb. boiler, of the Babcock and Wilcox C.T.M. type is now under construction in this house. The boilers are fed by two 200,000-lb., 6,000-r.p.m. Weir pumps. The latest extensions are shown in cross section in fig. 10. They comprise a further extension to the turbine room, a new boiler house (No. 3) on the railway side, and a new switch house on the river side, which form part of a scheme for the complete remodelling of the station. The two new 12,500-kW Parsons turbo-alternators, fig. 3, are of the tandem reaction type with double-flow low-pressure cylinders, which exhaust into twin surface condensers. At their most economical rating of 10,000 kW, the steam consumption is 11.1 lb. per kWh. Each condenser has a cooling surface of 9,500 sq. ft., together with its own turbine-driven circulating water pump and motor-driven condensate pumps in duplicate; steam-jet air pumps of the two-stage type in duplicate are provided for each machine. The circulating-water pump turbines discharge into heaters through which the condensate is passed. Provision is also made for passing steam from the low-pressure stages of the turbines into feed heaters, thus further increasing the temperature of the condensate.

Fig. 5.—Control Room; System Diagram.

The alternators generate three-phase current at 11,000 volts, and run at a speed of 3,000 r.p.m. They are provided with external fans and a closed system of ventilation, the air being cooled by coolers inserted in the foundation block and supplied with cooling water from the circulating system. Alongside the turbines are the boiler feed pumps and hotwells. The feed pumps are of the Weir single-stage type, driven by steam turbines at 6,000 r.p.m., and each is capable of delivering 250,000 lb. of water per hour against a total pressure of 250 lb. per sq. in. The exhaust steam from the turbines is passed straight into the hotwells.

No. 3 boiler house, fig. 4, will supersede No. 1 boiler house entirely in one direction, and be also extended at the other end. It contains at present four steel-cased water-tube boilers, with economisers, chain-grate mechanical stokers, and induced-draught plant. Three of these boilers are of the Babcock and Wilcox C.T.M. type, each having 10,040 sq. ft. heating surface and 250 sq. ft. grate area; the fourth is of the Clayton & Shuttleworth bent-tube type, with a Bennis grate; each has a normal evaporation of 50,000 lb. of water per hour, and a working pressure of 200 lb. per sq. in., with a total temperature of from 600 to 650 deg. F. Each pair of boilers is arranged with a double drive for the chain grates, a motor being connected at each

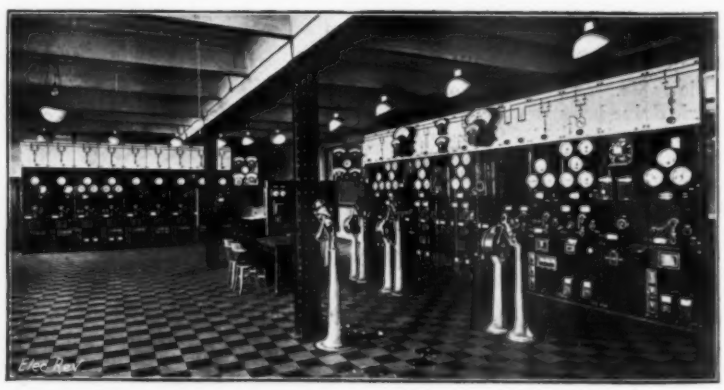


Fig. 6.—Thornhill Switch Control Room.

end of a continuous driving shaft equipped with a separating coupling between the two boilers. The new

Fig. 7.—Barugh "Waste Gas" Power Station.

boilers have a thermal efficiency of 85 per cent. on the net calorific value of the fuel as fired. The boiler basement is constructed to accommodate a yard locomotive. The ashes are transported to low-lying ground on the site by electric vehicles. The overhead bunkers are filled with coal from siding hoppers by means of gravity bucket conveyors. Provision is made in the elevator tower for two conveyors, each having a capacity of 50 tons per hour; facilities exist for the reception of coal either by rail or canal. The coal consumption of the station is about 1,200 tons per week.

The new switch house and control room, figs. 5 and 6, are equipped with a 9-panel distribution board and a 13-panel generating board. The instrument scales on the former are distinctively coloured, those of the voltmeters being pink; ammeters, white; power factor meters, red; and the wattmeters blue and pink; the blue side indicating outgoing energy and the pink incoming. The main generator and feeder oil switches, of the totally-

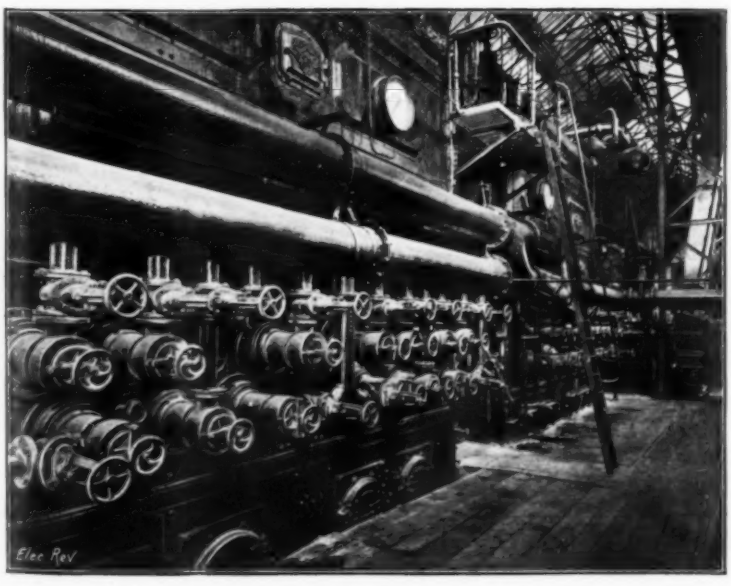


Fig. 8.— Barugh Coke Oven Gas-fired Boilers.

enclosed ironclad Reyrolle pattern, are on the first floor of the building. Each switch has a rupturing capacity of over 500,000 kVA at 11,000 volts, being operated remotely from the panels in the control room immediately above. A complete system of telephones and telegraphs connects the control room with the turbine and boiler houses and the other power stations on the system. Two large charts, one geographical and the other diagrammatical, fig. 5, showing the whole of the company's distribution mains, enable the control engineer to see at a glance the position of the controlling switches of all sub and generating stations, and he is thereby in touch with the whole of a system which covers an area of 1,800 square miles. The foundations for a new 33,000-V switch house are already down.

The Thornhill station is situated on the bank of the River Calder, and the screens are of the self-cleaning revolving open-disk type. Two new screens have been erected vertically, it having been decided that no advantage was gained by using the sloping screen. A lime-soda treating plant of 3,500 gallons per hour capacity is installed near the screens. Whereas in 1904 the site occupied 15 acres, the present area amounts to 85 acres. The duplication of all essential apparatus is one of the notable features, and applies to the auxiliary machinery for the turbo-alternators, the circulating pumps, and switchgear. The new station generates a kWh of electricity for less than 2 lb. of coal, the turbine steam

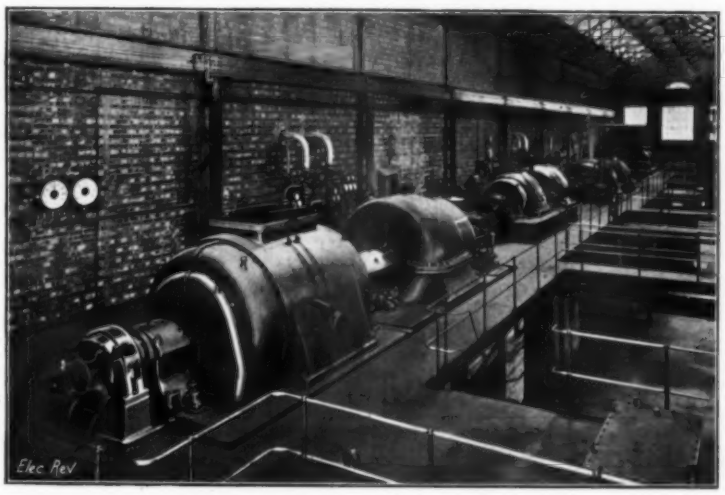


Fig. 9.—Barugh Turbine Room, June, 1925.

consumption being 11.1 lb. per kWh. The company's engineer and manager, Mr. W. B. Woodhouse (president of the Institution of Electrical Engineers), being fully appreciative of the economies to be derived from the use of "waste heat," it is not surprising that his Barugh power station (figs. 7 and 9), near Barnsley, utilises a large quantity of coke-oven gas, as indicated in fig. 8, in addition to a considerable amount of coal. This station has now reached a capacity of 20,000 h.p., and the use of surplus gas, which would otherwise be wasted, results in a saving of some 20,000 tons of coal per year, the station being, for its size and due to the particular conditions of working, more economical than many larger ones. The company's latest development is the establishment of a station at Ferrybridge, which is at present under construction, fig. 11. It is situated on the River Aire, near Knottingley, and will ultimately be of 200,000 kW capacity, the first machines being of 26,000 h.p. each.

The h.p. transmission network consists of both underground and overhead lines, fig. 14, being an example of the latter, and inter-

connectors are being laid between the main stations for 33,000- and 44,000-V transmission, one for 44,000 V being in service between the Ferrybridge and Mexborough stations. Some 300 sub-stations are in use, (see ELEC. REV., June 5th, 1925, pp. 890-891) development plans will be proceeded with.

In the company's area of supply there are no less than 70 electricity undertakings, of which 31 (cover-

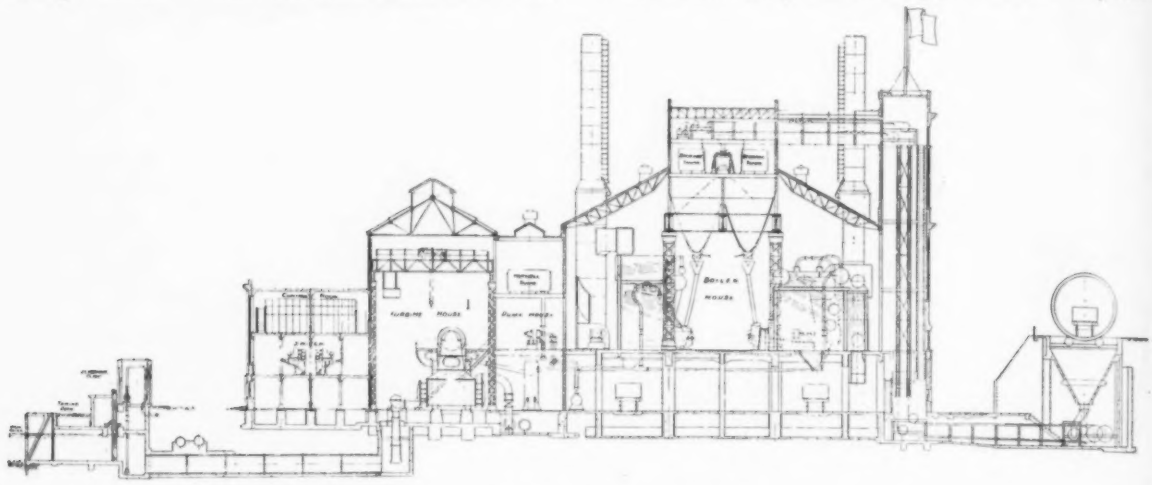


Fig. 10.—Cross-Sectional View of Latest Extension; Thornhill Power Station, 1925.

figs. 12 to 13 illustrating typical examples, while fig. 16 shows a mercury-arc rectifier situated in a glass works. Fig. 15 is indicative of the rural distribution system, designed to aid industrial redistribution and thus

ing an area of 650 square miles and a population of 556,750) are owned by Electrical Distribution of Yorkshire, Ltd. Of the remainder, the company has working arrangements or agreements with 27, and

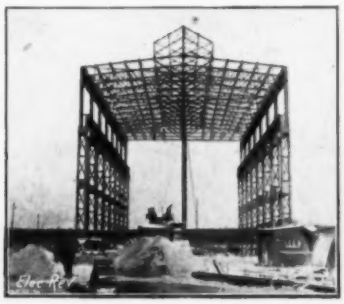


Fig. 11.—Ferrybridge Capital Station, April, 1925.

Fig. 12.—Typical 500-kW Sub-station.

Fig. 13.—Typical 10,000-kW Sub-station.

relieve congestion in the large manufacturing centres. In accordance with its policy of co-operation in the interests of economy, arrangements exist for the purchase of electricity by the Y.E.P. Co. from the Cor-

the following are somewhat striking examples of what has been already done:—The Elland Urban District Council shut down its generating station in 1921, prior to which the undertaking had been a burden on

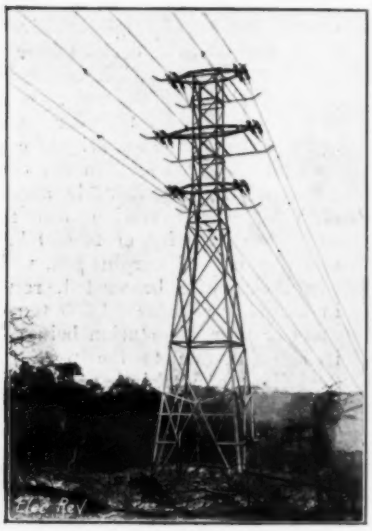


Fig. 14.—Overhead Transmission Line Tower.

Fig. 15.—Rural Sub-station and Overhead Line.

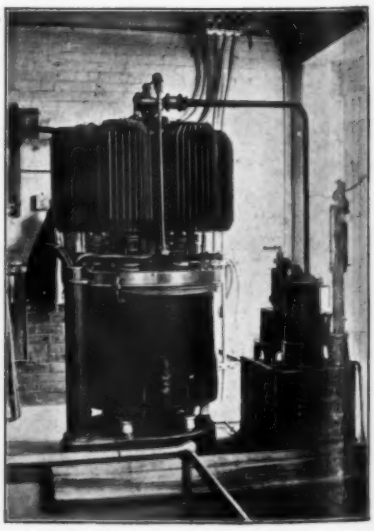


Fig. 16.—Mercury Arc Rectifier in Glass Works.

porations of Bradford, Leeds, Rotherham, and Sheffield, from generating plant that would otherwise be unoccupied. Now that certain legislative delays are ended

the rates; during the first year that a bulk supply was taken from the Y.E.P. Co. a gross deficit of £3,200 was turned into a gross profit of £1,138, thus enabling the

1925.

develop-

no less
(cover-

ation of
tion of
ny has
27, and

on.

oles of
an Dis-
n 1921.
rden on

ss Works.

oly was
200 was
ing the

Council to make an immediate reduction of 12½ per cent. in its tariffs. The gross profit for 1923 and 1924 has averaged £5,200, and the reductions in the charges now amount to nearly 30 per cent. in all since a bulk supply was first taken. During the same period the number of units consumed per head of population in the district has nearly been doubled. During the eight years ended March, 1922, the Heckmondwike Urban District Council suffered an average annual loss of £1,547 on its undertaking, the equivalent of a 7d. or 8d. rate. Since that date the Council has been taking a bulk supply entirely from the Company, resulting in economies amounting to £3,000 or £4,000 per annum and a reduction of about 20 per cent. in the tariffs.

Another interesting case is that of the undertaking of the Holmfirth Urban District Council, which for the seven years preceding 1923 made an average loss of £600 per annum, but after taking a bulk supply, a gross profit of £1,700 was made in the first year, enabling the charges to be reduced forthwith. In the last three years the consumption per head of population in the district has been more than doubled.

A further example is the undertaking of the Todmorden Corporation, which during the year prior to taking a bulk supply incurred a loss of £2,350. In the first year afterwards this loss was transformed into a profit of £3,383, the revenue having increased by over £2,000, and the operating costs decreased by £3,600. The profit for 1924 increased to £6,361, while the total reduction in the tariffs since the bulk supply was taken now exceeds 33 per cent. These reductions gave an immediate impetus to consumption, which has more than trebled itself in the last three years.

The foregoing examples of what has been done for these local authorities in the West Riding, who now purchase their supplies of electricity in bulk from the Yorkshire Electric Power Company, are a remarkable testimony to the efficiency of the large central generating station operating over a wide area.

Contracts Open and Closed

(*Continued from page 98.*)

Open.

Glasgow.—July 24th. Corporation. Electrical installation at the Belvedere housing scheme. Specification from the engineer.

Grimsby.—August 1st. Electricity Department. Storage battery, booster, and switchgear. (July 10th.)

Leeds.—Library and Arts Committee. Electric lighting installation at the Public Library, Cardigan Road, Burley. Particulars from Mr. G. B. Howcroft, architect, Uppermill, near Oldham.

London.—ST. PANCRAS.—September 3rd. Electricity Department. One 10,000-kW steam turbine, alternator, condensing plant, pipes, &c. (See this issue.)

BETHNAL GREEN.—July 20th. Electricity Department. L.p. cables and switchgear. (July 10th.)

ST. MARYLEBONE.—August 31st. Highways Department. One 200-kW turbo-alternator set with surface condenser and auxiliaries; one second-hand 200-kW, 200/220-d.c. generator set. (See this issue.)

H.M. OFFICE OF WORKS.—July 31st. Incandescent lamps. (See this issue.)

Liverpool.—Waterworks Committee. Small electrically-driven centrifugal pumps at Prescot, Lancs. Mr. J. R. Davidson, water engineer, 55, Dale Street, Liverpool. (£2 2s.)

Manchester.—July 20th. Electricity Department. Electric cooking ranges, and switches and cut-outs for 12 months. (July 3rd.)

Electricity Department. Three-phase, 6,600-V switchgear for Dickinson Street and 6,600-V switchgear for Bowker Vale. (See this issue.)

New Zealand.—WELLINGTON.—August 18th. Posts and Telegraph Department. Switchboard plugs.*

INVERCARGILL.—August 17th. Electricity Department. Four 667-kVA single-phase transformers.*

MARLBOROUGH.—September 22nd. Electric Power Board. Turbines, generators, and switchgear. (B.X. 1,904.)*

Nottingham.—August 7th. Electricity Department. One 20,000-kW turbo-alternator, with exciter, condenser, air pumps, oil coolers, air coolers, and auxiliary plant. (See this issue.)

South Africa.—JOHANNESBURG.—August 1st. Municipal Council. Twelve a.c. power relays.*

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Closed.

Brighton.—Electricity Committee. Accepted:—
Pulverised fuel firing equipment (£1,970).—Underfeed Stoker Co., Ltd.

Chesterfield.—Electricity Committee. Accepted:—
Three Cope's feed-water regulators for boilers.—James Gordon & Co., Ltd.

Glasgow.—Baths and Wash-houses Committee. Accepted:—
Electrical installation at Whiteinch Baths (£694).—Johnston, Park & Co.

Tramways Committee. Accepted:—
Special track work.—Hadfields, Ltd.
V.i.r. cable.—Siemens Bros. & Co., Ltd.

Guildford.—Electricity Committee. Accepted:—
Cable.—British Insulated & Helsby Cables, Ltd.

Hastings.—Electricity Committee. Recommended:—
Two 2,000-kVA transformers (£2,973).—Ferranti, Ltd.

Irish Free State.—Contracts placed by the Commissioner of Public Works, Dublin, during the month of June:—
Provision of a h.p. main, Governor-General's residence.—City Electrical Engineer, Dublin.
Altering and extending electric lighting system, Governor-General's residence.—Brooks, Thomas & Co., Ltd.
Electrical works and supplies, Dublin district.—Handley & Robinson, Ltd.—*Irish Builder and Engineer.*

DUBLIN.—Commissioners for the County Borough.—Nine firms submitted tenders for the supply of the Electricity Department's requirements of arc lamp carbons for the coming year, viz.:—

	9 mm. x 15 in. per 1,000 carbons. £ s. d.	9 mm. and 8 mm. x 15 in. per 1,000 carbons. £ s. d.	18 mm. and 12 mm. x 12 in. per 1,000 pairs. £ s. d.
Beacon Carbons, Ltd. ...	3 12 0	6 12 3	15 0 0
E. A. Langrish & Co. ...	4 10 0	7 7 6	9 12 6
W. Geipel & Co.	3 13 6	6 15 6	11 10 0
Henrion Carbons, Ltd. ...	3 13 6	6 15 6	11 10 0
General Electric Co., Ltd.	4 12 0	8 8 6	11 7 0
Sloan Electrical Co. ...	4 14 6	7 9 6	11 6 3
Electric Equipment & Carbon Co., Ltd. ...	5 4 0	9 2 0	15 16 0
Siemens-Schuckert ...	5 6 0	9 6 0	16 7 6
Chapman & Chapman ...	6 6 0	10 7 3	18 10 0

The lowest tenders in each case have been accepted, namely:—Beacon Carbons, Ltd., for 9-mm. x 15-in. and 9-mm. and 8-mm. x 15-in. carbons. E. A. Langrish & Co., for 18-mm. and 12-mm. x 12-in. carbons.—*Irish Builder and Engineer.*

Lamp Contracts.—The London, Midland & Scottish Railway Co. has renewed its contract with the Siemens & English Electric Lamp Co., Ltd., for Siemens gasfilled lamps; and the London & North-Eastern Railway Co. has placed a contract for six months' supply of metal-filament lamps with the Edison Swan Electric Co., Ltd. The General Electric Co., Ltd., has received a three-years' War Office contract for "Osram" vacuum and gasfilled lamps, and a six months' contract from the L. & N.E. Railway for "Osram" vacuum and gasfilled lamps and Robertson carbon-filament lamps.

London.—LAMBETH.—Board of Guardians. Accepted:—
Special electric light fittings for the board room.—Owen, Barnes & Co.

LONDON COUNTY COUNCIL.—Housing Committee.
Wiring and fittings for electric lighting in five block of tenements, East Hill estate:—

Heath-Pritchard, Ltd. (Accepted.)	**£1,656**
T. Clarke & Co., Ltd.	1,766
Smethurst & Co. (London), Ltd.	1,863
Alpha Manufacturing & Electrical Co., Ltd.	1,891
A. Meckhonik	1,896
Stegman & Co.	1,970
A. Hawkins & Sons	2,099
Tredegars (1923), Ltd.	2,127
British Electrical Installations Co.	2,136
H. J. Cash & Co., Ltd.	2,229
Commercial Telephone & Electrical Co., Ltd.	2,310
Power Contracts, Ltd.	2,501
T. H. Smerdon	2,600
Griggs & Sons	2,740
Belgravia Electrical Co., Ltd.	2,867
G. A. Weston	3,731
W. E. Heath & Co.	4,174

Fire Brigade Committee. Accepted:—
Wiring and fitting for electric lighting new fire station, Peckham Road (£180).—Commercial Telephone & Electrical Co., Ltd.
Installation of motor generators, Bayswater fire station, and Peckham Road new fire station.—Crypto Electrical Co., Ltd.

Highways Committee. Accepted:—
Twelve months' supply of "Bitite" grout (3,000-4,000 tons).—Dunsek Bitumen Co., Ltd.

Education Committee. Recommended:—
Electric lighting and equipment, London Printing School (£318).—A. Hawkins & Sons.

Reading.—Board of Guardians. Accepted:—
Electrical work in connection with the equipment of a new laundry at Battle Infirmary.—Haden & Sons, Ltd.

Spenborough.—Urban District Council. Accepted:—
Electrician's work required in connection with the new public abattoirs.—Butler & Horn.

Housing Committee. Accepted:—
Electrical installation in 60 houses now being erected for the Council.—Stead & Firth.

Stafford.—Staffs. Education Committee. Accepted:—
Installing electric light at Corporation Street schools (£213).—W. Hampton.

Uxbridge.—Fire Committee. Recommended:—
Installation of electric siren (£168).—Walters & Co.

Winchester.—Town Council. Accepted:—
Supply of electricity meters for 1 year.—Chamberlain & Hookham, Ltd.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names of makers or suppliers of :—

NER-A-LITE shop-window fittings.

Notes.

The Women's Engineering Society.—AN INTERNATIONAL CONFERENCE.—At the British Empire Exhibition, Wembley, this week, an "international conference of women in science, industry, and commerce," is being held, under the auspices of the Women's Engineering Society and kindred bodies, including the Electrical Association for Women. The conference was to be opened on Wednesday by the President, H.R.H. the Duchess of York, with Lady Astor, M.P., in the chair, and after luncheon there was to be a tour of the Exhibition. The speakers and delegates were to be entertained to luncheon at the Wembley Garden Club by the President and Council of the British Electrical Development Association (Inc.), and amongst those present were to be Miss Margaret Bondfield, J.P., Mr. W. E. Woodhouse, Pres. I.E.E., and Miss V. Holmes, A.M.I.Mech.E. On Thursday the morning session was to be devoted to "Engineering, Chemistry, and Research," Miss C. Griff, A.M.I.A.E., presiding, and one of the papers was entitled "Electricity Applied to Mining," by Miss H. M. Davis; the subject for the afternoon was "Industrial Welfare and Factory Inspection," with Mrs. Willson, M.B.E., in the chair, and a reception was arranged for the evening. To-day, Mrs. Hoster will preside at the morning session, on "Commerce and Salesmanship," papers being read by Miss G. Burlton, B.A., on "Salesmanship" and by Miss L. F. Nettlefold, LL.B., on "The place of the Wholesaler in the Scheme of Distribution"; and in the afternoon, with Alderman Mrs. Hammer in the chair, the subject will be "Electricity—Domestic Science," papers being read on "Producing and Distributing Electricity" by Miss M. Partridge, B.Sc., and "At Home with Electricity," by Miss T. J. Dillon, B.Sc. and accompanied by a special demonstration of electrical apparatus. In the evening there will be a dance.

The L.C.C. Tramways.—The accounts of the London County Council tramways for the past year (which were summarised in our last issue, p. 80) came before the Council at its meeting on July 7th. Mr. Angus Scott attributed the deficit which had been incurred to unrestricted and wasteful omnibus competition. He pointed out, too, that a seventh of the tramway revenue was derived from workmen's fares which were unremunerative; the 'buses offered no such facilities. Although the undertaking had not covered all its charges, it was absurd to talk of scrapping a system which still had a £9,000,000 debt outstanding. He denied that the tramways were bankrupt; they were still a valuable asset to London.

Mr. J. C. Dalton considered that the system had outlived its usefulness. Nothing further should be spent on it and its abolition should be looked to.

Mr. J. P. Blake thought that it was impossible for the tramway to succeed if the view of the last speaker was that of the controlling party on the Council. He wanted to see the tramways working out their own salvation rather than receiving any form of "protection."

Mr. Gatti, chairman of the Finance Committee could not agree with the proposal which was often put forward that the tramway should be relieved of rates and road maintenance. He thought that the present serious position would be got over and the tramways restored to the position of prosperity which they occupied until recently.

Appointments Vacant.—Temporary vacancies in the Wireless and Electrical Branch of the Aeronautical Inspection Directorate (£235). Clerk (70s.), for the Sevenoaks and District Electricity Co., Ltd. Meter fixer and plumber-jointer, for the Workington Corporation. (See our advertisements pages to-day.)

The Manchester Annual Report.—A very bad error occurred in our review of the report upon the Manchester electricity undertaking (June 19th, p. 996), it being stated that the energy sold had increased from 24,905,469 kWh to 26,816,400 kWh. These figures are obviously incorrect for an undertaking the size of Manchester's; the correct figures are respectively 222,203,023 kWh and 257,352,920 kWh.

Smoke Abatement.—For the benefit of the delegates attending the Harrogate Advertising Convention a smoke abatement demonstration and lecture were given at the Harrogate electricity works by Mr. W. H. Casmey, of Burley-in-Wharfedale. The demonstration was arranged by Captain H. R. Webster (chairman of the Electricity Committee) and Mr. George Wilkinson (manager of the works) presided. Two Lancashire boilers were used for the demonstration.

Educational.—UNIVERSITY OF LONDON.—In the Faculty of Engineering at University College diplomas in Electrical Engineering have been awarded to Messrs. A. C. Beck, C. Moody, S. R. Witt (with distinction), and W. A. P. Wykeham.

POLYTECHNIC EXTENSIONS.—Important items were considered by the London County Council Education Committee at its meeting on July 15th. A building grant of £50,000 towards the cost of the erection and equipment of a new polytechnic in St. Pancras is proposed; the total cost is estimated at £112,745. This polytechnic will include a commercial department and a junior technical school for light engineering trades, says *The Times*. Among the grants recommended are a maintenance grant of £27,000 per annum for five years to the Imperial College of Science and Technology, South Kensington, and a building grant of £30,000 for the extension of the Regent Street Polytechnic. The governors of the Polytechnic contemplate spending £250,000 in all on enlargements. They report that the Polytechnic has now over 12,000 students and 300 teachers, and that the demand on the accommodation has increased by nearly 90 per cent. during the last 12 years, with the result that many students have had to be refused admission.

Institution Notes.

Institution of Electrical Engineers.—A.M.I.E.E. EXAMINATION.—The next examination will be held on October 29th, 30th, and 31st, 1925. Candidates must be either Students or Graduates of the Institution, or have lodged with the secretary a duly completed form "E" for election as Associate Member. Entry forms for the examination, which must be completed and returned by September 1st, and particulars regarding election to membership of the Institution may be had on application to the secretary, The Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2.

Diesel Engine Users' Association.—MECHANICAL INJECTION.—At the July meeting of the Association, held at Maidenhead, some notes on the "Working of the Ruston Mechanical Injection Oil Engine" were presented by Mr. C. O. Milton, and discussed. The author gave detailed information concerning his experience in the working of such engines and explained the conditions and special circumstances which he had to take into account when ordering this particular type of engine. One of the engines had already been at work for over 8,000 hours. Prior to the meeting members took the opportunity of visiting the Maidenhead electricity works to see the two mechanical high-compression engines which are installed there.

Permanent-way Institution.—SHEFFIELD CONFERENCE.—The business proceedings at the annual conference of the Permanent-way Institution, held last week at Sheffield, were interspersed with a considerable round of social functions and visits to local works. The delegates numbered about 150 from all branches in Great Britain and the Colonies. Following the annual meeting on the first day of the convention, Mr. E. A. Wilson, of the Metropolitan Railway, presided at the annual dinner, at which Mr. Fearnley, manager of the Sheffield tramways, referring to a suggestion that as Sheffield was the home of so much that went to the making of a successful tramway system, the introduction of a "stainless car" should be considered, remarked that at last they had been successful in getting stainless steel fittings in order to do away with the brasswork. Some sets had now been fitted, and they hoped considerable economy would result. Mr. Joseph Ward told how the first steel rails came to be laid, and among the establishments visited by the delegates during the week were those of Messrs. Samuel Osborn & Co., Ltd., and the Titan Trackwork Co., Ltd., where the visitors saw moulds for trackwork for railways and tramways and were particularly interested in a big lay-out for the Sheffield tramways, as well as others in process of construction. A 30-cwt. electric furnace was shown in operation, and the visitors were entertained to luncheon by the directors, with Mr. Fredk. Osborn in the chair.

The Faraday Society.—At the annual general meeting of the above Society, held on July 6th, the following officers and members of the Council were elected :—President: Professor F. G. Donnan. Past-presidents: Sir Robert Hadfield, Prof. Alfred W. Porter, and Sir Robert Robertson. Vice-presidents: Mr. W. R. Bousfield, Prof. C. H. Desch, Dr. W. H. Hatfield, Prof. W. C. Lewis, Mr. C. C. Paterson, Prof. A. O. Rankine, and Dr. E. K. Rideal. Treasurer: Mr. R. L. Mond. Council: Prof. E. N. da C. Andrade, Mr. C. R. Darling, Dr. J. E. Coates, Dr. F. A. Freeth, Dr. B. A. Keen, Dr. E. H. Rayner, Dr. F. C. Toy, Mr. H. T. Tizard, Dr. R. S. Willows, and Prof. E. C. Williams. The report of the Council draws attention to the fact that general discussions on the following subjects were held during 1924 :—"Fluxes and Slags in Metal Melting and Working," "Physical and Physico-Chemical Problems Relating to Textile Fibres," "The Physical Chemistry of Igneous Rock Formation," "Base Exchange in Soils." It is the policy of the Society to co-operate wherever possible with other scientific societies, and three of these discussions were held jointly. The policy of co-operation is also extended to the American Electrochemical Society, in that by a mutual arrangement, the transactions of each society are supplied to the members of the other society at a special rate. In addition to the general discussions, four ordinary meetings were held. During the year 33 new members were admitted to the Society.

There was an adverse balance of £293 on the year's work, due to the great amount of material published. While loath to diminish the Society's activities, it has been decided to limit the general discussions for the time being to two a year, and it is expected, as a result, to balance income and expenditure during the present year.

Institution of Mechanical Engineers.—NEWCASTLE MEETING.—In commemoration of the Centenary of the opening of the Stockton and Darlington Railway, members of the Institution of Mechanical Engineers, who met recently in Newcastle-on-Tyne, paid a visit on July 8th to the Faverdale works of the L. & N.E.R. Co. at Darlington, and there inspected the exhibition of locomotives and railway appliances. Luncheon was given by the L. & N.E.R. Co. to the visitors, who were presided over by Mr. H. N. Gresley, chief engineer of the L. and N.E.R. Co. Sir Hugh Bell, extending a welcome on behalf of the Railway Company, proposed the health of the Institution, and coupled with it the name of the president, Sir Vincent Raven. He regretted, he said, that the North-Eastern Railway Co.—not the L. & N.E.R.—was not the absolute pioneer in main-line electrification. That they had run the first railway in the kingdom was not bad; that they should have run an express electrical train from Newcastle to York would have been a fitting thing for them to have done. Sir Vincent, responding, said it was more economical to run trains electrically than by steam. He had pursued that line, and had visited other countries, which had gone ahead of us in that direction, mentioning America and Germany in particular. He believed that before he left the N.E.R. Co. he had persuaded Sir Hugh Bell and also Sir Arthur Pease that, given certain conditions—density of traffic and cheap electricity—it would be a great advance. He thought it would be only a question of time before they would see something done in that direction.

A number of members visited the works of Messrs. A. Reyrolle & Co., Ltd. Hebburn-on-Tyne. They were received by Mr. Norbert Merz, Mr. H. W. Clothier, Mr. H. W. Miller, and members of the staff at the New Town Works, where they were able to see a practical demonstration of the company's very thoroughly organised system of production. The party then proceeded to the Old Town Works, where specimens of Messrs. Reyrolle's well-known apparatus were inspected, amongst which was switchgear for mining and industrial service, together with sub-station, power-station, and super-power station panels. A very interesting programme of experiments was arranged in the laboratory, and high-voltage phenomena produced by a 450,000-V testing transformer were much appreciated. The visitors were entertained to tea by the company, and Mr. Chas. Day, on behalf of the Institution, in the course of his remarks, commented specially upon the fine layout of the equipment of Messrs. Reyrolle's works.

Institution of Public Lighting Engineers.—The second annual general meeting will be held at Leeds on September 14th to 16th, 1925, under the presidency of Mr. S. B. Langlands, J.P., and the new president, Mr. C. S. Shapley. One of the papers to be read is entitled "Electric Street Lighting in Rural Areas," by Mr. E. C. Lennox, of the Newcastle-on-Tyne Electric Supply Co., Ltd. The hon. secretary, Capt. W. J. Liberty, Guildhall, London, has received the implied sanction of the Ministry of Health for the payment of the expenses of delegates to the meeting by local authorities. Full particulars can be obtained from Capt. Liberty.

Our Personal Column.

(Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements).

At the recent Convention at San Francisco, Mr. JAMES E. DAVIDSON, vice-president and general manager of the Nebraska Power Co., was elected president of the National Electric Light Association.

A meeting of representatives of the South-East Lancashire Electricity Advisory Board, and undertakings in the North-West Midlands area, took place at the Manchester Town Hall on July 7th, in order to make a presentation to Mr. S. L. PEARCE, who is relinquishing the office of chief electrical engineer of the Manchester municipal electricity undertaking to become an Electricity Commissioner. The presentation took the form of a mahogany writing table and a chair to match. The top of the table bore a silver plate on which the following inscription was engraved:—"This desk was presented to S. L. PEARCE, Esq., C.B.E. M.Sc.Tech., as a mark of professional and personal esteem, on the occasion of his appointment to the Electricity Commission, by the constituent authorities of the South-East Lancashire Electricity Advisory Board and the authorised undertakers in the North-Western area, in appreciation of his services to such board and his conciliation work for the industry. 7th July, 1925." Alderman W. T. Dagnall, chairman of the Advisory Board, in making the presentation, spoke of Mr. Pearce's work in connection with the technical development of the area and especially in the formation of the Board and its predecessors. Alderman Dagnall said that Mr. Pearce occupied the chair of the Engineering Advisory Committee of the Board not by virtue of his being the the chief engineer of the largest undertaking in the area, but on account of his professional and personal qualities and his reputation for fairness and impartiality. He regretted that they were losing Mr. Pearce, but they wished him happiness and success in his new and wider sphere of usefulness. Alderman Higham, chairman of the employers' side of the District Joint Industrial Council for the area, supported Alderman Dagnall's appreciation and referred to Mr. Pearce's conciliation work. Alderman Clark, chairman of the employers' side of the District Joint Board, also testified to Mr. Pearce's important part in the technical and conciliation work of the area. In replying, Mr. Pearce said that the technical success with which he had been credited had only been achieved with the loyal and unstinted help always received from his colleagues. He thought that the Board had accomplished a great deal of useful work in the realisation of the spirit of the Electricity (Supply) Act of 1919. He asked those present to believe that the qualities of fairness which they had kindly attributed to him would always be fully exercised in the carrying out of his new duties. After briefly mentioning the activities of the Joint Board and Industrial Council, Mr. Pearce concluded by thanking the chairman for the writing table and chair, expressing the hope that he would not lose touch with those with whom he had worked so long.

Mr. H. C. HAMBRO has joined the board of the Eastern Telegraph Co., Ltd.

Mr. LESLIE C. SHARP, son of Mr. Ernest E. Sharp, will on Monday next, 20th inst., join his father in the business of Venner Time Switches, Ltd. For some years past he has been securing practical experience in certain branches of electrical manufacturing work and in central electricity supply station work, which should stand him in good stead in devoting his attentions to the outside work of the above company.

The Chesterfield Electricity Committee has appointed Mr. S. H. FOWLES, technical assistant at the electricity works, as station superintendent, and Mr. G. H. DAVIES as assistant station superintendent and relief shift engineer.

The marriage took place at All Saints' Church, Benhilton, Sutton, Surrey, on June 27th, of Mr. LEONARD H. SHORT, M.C., of the English Electric Co., and Miss GLADYS BOX.

Mr. D. MACLENNAN manager of the Alloa electricity works, who has been appointed manager of the Inverness Corporation electricity works has been presented with a Westminster chiming clock by the Alloa Town Council in appreciation of his services during the past five years.

The Keighley Corporation Tramways Committee, after interviewing five out of the 67 applicants for the post of manager of the Tramways Department, has recommended the appointment of Mr. RONALD A. FEARNLEY, chief assistant engineer to the Sheffield Corporation Tramways and Motor-'bus Department, and son of the manager of the Sheffield Tramways.

The marriage took place on July 11th at All Souls, Langham Place, London, of Mr. FRANK A. NEWINGTON, of Bircholme, Hawkhurst, Kent, to Janie, only daughter of the late Dr. and Mrs. Ross Watt, Arnisfield, Ayr.

Modern Transport states that the directors of the Southern Railway have appointed Mr. A. Raworth electrical engineer for new works and to co-operate with Mr. Herbert Jones, the company's electrical engineer, with regard to the preparation of electrification schemes. Mr. Raworth, prior to grouping, was electrical engineer of the former South-Eastern and Chatham Railway, and as engineer of the South-Eastern and Chatham Construction and Power Company (a subsidiary company formed to carry out the electrification of the company's suburban lines) he has been responsible for the designs and execution of the scheme, the first three sections of which were formally opened to electric traction on July 12th.

Hove Town Council has appointed Mr. ALAN PROPERT assistant engineer at the Corporation electricity works.

Mr. A. M. SAMUEL, M.P., Parliamentary Secretary of the Department of Oversea Trade, has appointed SIR RICHARD REDMAYNE K.C.B., formerly chairman of the Imperial Mineral Resources Bureau, which has now been amalgamated with the Imperial Institute, to be Director of the Imperial Institute for a short period in order that he may supervise the amalgamation of the two bodies.

The Worcester City Council has granted extended leave (six weeks, in August and September) to Mr. C. W. SHAW, the city electrical engineer, to enable him to visit the United States at the invitation of the President of the Detroit Edison Electric Supply Co. The Council at the same meeting approved of the proposal to increase Mr. Shaw's salary from £800 to £1,000 per annum in fulfilment of a pledge that the question of his remuneration should be considered when the Order giving the Corporation powers over a larger area, was through.

The Harrogate Electricity Committee on Monday recommended the Council to increase the salary of Mr. GEORGE WILKINSON, the borough electrical engineer, by £150 per annum to £950 on condition that he gives up all private practice and consulting work.

The Wolverhampton Town Council on Monday decided to increase the salary of the tramway manager (Mr. OWEN SILVERS) from £850 to £950 per annum.

As was briefly announced in our last issue Dr. T. F. WALL has been appointed head of the Electrical Engineering Department of Sheffield University. Dr. Wall was educated at the Liverpool Grammar School and Liverpool University College. He graduated in the Honours School of Engineering in the Victoria University of Manchester. He was special research scholar in electrical engineering in the then newly-established University of Liverpool and was subsequently elected to the "1851 Exhibition Scholarship," which he held for two years in the Elektrotechnisches Institut, Karlsruhe, Germany, where he was engaged on research work in the laboratories of the late Dr. Englebert Arnold. In 1912 the degree of Doctor of Science was conferred on him by the Victoria University of

Manchester, and in 1914 the degree of Doctor of Engineering by the University of Liverpool, for research work in electrical engineering. He served as an apprentice in the shops and drawing office of Messrs. Boothroyd, Hyslop & Co., Bootle, mechanical and electrical engineers, and subsequently acted as electrical designer to that firm. He was then engaged as an electrical designer with Siemens Brothers Dynamo Works, Ltd., Stafford. For several years he was lecturer and organising supervisor of the electrical engineering laboratories in the University of Birmingham under the late Prof. Gisbert Kapp. During the war he held a commission as lieutenant in the Royal Naval Volunteer Reserve and was particularly engaged on the development of electrical apparatus which he had invented for signalling to submerged submarines and for which an award was made by the Admiralty Council. The Admiralty has subsequently acquired several patents of his relative to applications of electricity for naval purposes. He has contributed a large number of original communications to the leading technical journals and to the British Association—in particular, the outline of a proposal for the long-distance transmission of electrical energy in connection with the Severn barrage scheme. In the year 1921 Messrs. Methuen published his book on "Electrical Engineering." Dr. Wall has been external examiner in electrical engineering to Queen's University, Belfast, and local examiner in the Midlands for the Institution of Mining Electrical Engineers. He is a member of the local committee of the Institution of Electrical Engineers, and an Associate Member of the Institutions of Civil and Electrical Engineers. Since going to Sheffield University, Dr. Wall has been responsible for the design and equipment of the "Edgar Allen Research Laboratory," in which a large amount of research work has been carried out and extensive investigations of a fundamental nature are now in progress.

Dr. T. F. Wall,
Head of the Electrical Engineering Department, Sheffield University.

Mr. GUY BURNEY, managing director of the Sterling Telephone & Electric Co., Ltd., informs us that he has decided to retire from that business, and at the end of this month will go to France for a holiday. He has no further plans, but if, after a long rest, he undertakes any other commercial venture, it will be of a less strenuous character. Mr. Burney founded the business in 1900, as a branch of the Berliner Telephone Mfg. Co., of Hanover, and in collaboration with that company's engineers, introduced the "Era" telephone, which, he claims was the first commercial multiple automatic interphone to be put on the market; it was this apparatus that brought the company into prominence. In 1909 works were acquired at Dagenham, and the business, which continued to expand rapidly, was converted into a private limited liability company. On the outbreak of war Mr. Burney offered the works *en bloc* to the War Office and Admiralty for use in any capacity; the offer was not accepted, but the company carried out large contracts for the Government departments and at the end of the war was employing 2,200 people day and night on the production of fuses and field telephones. Mr. Burney received the thanks of the War Office, Air Ministry, and Ministry of Munitions for his services. At an early stage in the war the German shareholding was acquired by British investors, through the Public Trustee. The Dagenham works now cover 12 acres, and are engaged in the production of Post Office and domestic telephones, and wireless apparatus, employing 2,600 people in the busy season.

Mr. Burney was founder and first chairman of the Telephone Manufacturers' Association and of the National Association of Radio Manufacturers, and is a member of the P.M.G.'s Advisory Committee on broadcasting. He took an active interest in labour problems during the war, and has always provided for the comfort and welfare of the workers, including the athletic and social side. In business his slogan was "Aim high!" and his policy progressive, demanding a high standard of quality in the products of his company, the success of which has been largely due to the energy and ability with which he has conducted its affairs, and the foresight which enabled him to anticipate and provide for the requirements of the market.

Mr. Guy Burney,
Founder and managing director of Sterling Telephone and Electric Co., Ltd.

Mr. HAROLD HOBSON, who has been appointed joint manager of the County of London Electric Supply Co., Ltd., and whose portrait accompanies this note, was educated at King's College, London, where he took the degree of B.Sc. (Engineering).

Elliott & Fry] **Mr. Harold Hobson,** *[London.*
Joint manager of the County of London Electric Supply Co., Ltd.

His practical training was received at the Rugby works of the British Thomson-Houston Co., Ltd., and elsewhere. In 1914 he became assistant engineer at the Darlington office of Messrs. Merz & McLellan, and later went to their Middlesbrough office. In 1920 he became personal assistant in London to one of the partners of the firm, and recently he has occupied the position of engineer-in-charge of the construction of the Barking station and other work for the County of London Co.

Mr. H. C. LAMB, the new chief of the Manchester electricity undertaking, has been elected to the employers' side of the No. 3 District Council (North-Western Area) Electricity Supply industry, in succession to Mr. S. L. Pearce.

Obituary.—MR. JOERGENSEN.—A *Reuter* dispatch from Helsingfors states that on July 9th, while Mr. Joergensen, the manager of the Great Northern Telegraph Company in Finland, was sailing in his yacht near Nystad the yacht was struck by lightning. All those on board were killed, with the exception of one of Mr. Joergensen's daughters.

MR. S. DEAN.—Mr. Samuel Dean, who was the first electrician to be appointed by Lever Bros., Port Sunlight, whom he served 34 years, died at Port Sunlight last week at the age of 60.

Wills.—The late Major FREDERICK COUTTS, general manager of the Yorkshire (West Riding) Electric Tramways Co., left £12,670.

Mr. W. A. HARPER, of Harper Bros. & Co., consulting engineers, left £3,843 gross and £2,420 net personalty.

New Companies Registered.

Giljay Patents, Ltd. (207,053).—Private company. Registered July 3rd. Capital, £500 in £1 shares. To acquire and turn to account any patents, rights, *brevets d'invention*, licences, protection, privileges and concessions, and to carry on the business of electricians, electrical and mechanical engineers, &c. The permanent directors are:—N. W. Gilbert, "Aucklands," Lapworth, Warwickshire, electrical engineer; A. E. Jabet, 59, Hazelwood Road, Acocks Green, Birmingham, electrical engineer; J. H. Kitchen, 85, Featherstone Road, King's Heath, Birmingham, solicitor. Solicitor: J. H. Kitchen. Registered office: King's Road, Hay Mills, Birmingham.

Davis, Cash & Co., Ltd. (207,032).—Private company. Registered July 3rd. Capital, £10,000 in 5,000 7½ per cent. cumulative preference and 4,900 ordinary shares of £1 each and 2,000 founders' shares of 1s. each. Objects: To carry on the business of designers and craftsmen in metals and electrical accessories carried on by C. H. Davis and F. T. Cash at 47, Mount Pleasant, London. The directors are:—C. H. Davis (chairman), Bushcroft, Wormley, Hertford; F. T. Cash, Normancroft, Elm Road, Sidcup, Kent (both permanent joint managing directors). Secretary: E. A. Cash. Solicitors: Godwin & Son, 26, Cannon Street, E.C.4. Registered office: 47, Mount Pleasant, Clerkenwell, E.C.1.

Rapinet, Ltd. (207,112).—Private company. Registered July 6th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of wireless instruments and accessories, &c. The directors are:—D. J. Phillips, "San Marino," Upper Tooting Park, S.W.17; H. P. Rapinet, 19, Westbourne Terrace Road, W.2. Qualification, 1 share. Remuneration, £150 each per annum. Registered office: 39-47, Groton Road, Earlsfield, S.W.18.

Power Development Co., Ltd. (207,12).—Registered as a private company on July 6th, with a nominal capital of £22,000 in 20,000 preference shares of £1 and 40,000 ordinary shares of 1s. The preference shares confer the right to a fixed cumulative preferential dividend of 6 per cent., and in a winding up to have the assets available for distribution applied first in paying off capital and arrears of dividend, but do not confer any further right to participation in profits or assets. Objects: To form, promote, subsidise and assist companies, syndicates, and partnerships, to carry on or carrying on all or any of the businesses of electrical and general engineers, and manufacturers and maintainers of plant for the generation, accumulation, transmission, and supply of electrical energy for the purposes of light, heat, power or otherwise; to carry on business as bankers, capitalists, financiers, concessionnaires and merchants, &c. The subscribers (each with one preference share) are:—J. S. Mellor, Kennans House, Crown Court, Cheapside, E.C.2, solicitor; H. R. Turner, Kennans House, Crown Court, Cheapside, E.C.2. The first directors are to be appointed by the subscribers. Qualification, 500 preference or ordinary shares. Remuneration as fixed by the company. Solicitors: Wild, Collins & Crosse, Kennans House, Crown Court, Cheapside, E.C.2. Registered office: 6, Old Jewry, E.C.

New Wireless League, Ltd. (207,185).—Private company. Registered July 10th. Capital, £100 in £1 shares. To look after the interests that may arise (legal or otherwise) of the members of the company, to formulate an insurance scheme, and to act in any other way that may seem beneficial to the directors on behalf of the members, &c. The first directors are:—W. A. McAlonan, 16, Elm Park Road, Winchmore Hill, N.21, publisher; W. B. Cooper, 64, Clarendon Road, Walthamstow, advertising manager; J. M. Grey, 26, Palmerston Road, Westcliff-on-Sea, publisher. Qualification, 10 shares. Solicitors: Firth & Co., 5, Chancery Lane, W.C.2. Registered office: Astor House, Aldwych, W.C.2.

Woodfyt Sales, Ltd. (207,152).—Private company. Registered July 8th. Capital, £2,550 in £1 shares. Objects: To carry on business as selling agents primarily supplied by Woodfyt Manufacturing Co., Ltd., to act as agents for other companies or persons interested in electrical furnishing equipment or in furniture and fittings of any other description, &c. The directors are:—C. G. North, 22, Blagdon Road, New Malden, wood work manufacturer (permanent); Charles Abbotts Smith, 12, Selwood Road, Addiscombe, sales manager; Charles Allin Smith, 12, Selwood Road, Addiscombe, company secretary. Qualification, £50. Solicitor: N. E. Carey, 2, Verulam Buildings, Gray's Inn, W.C.1. Registered office: 8, Diana Place, Euston Road, N.W.

Electrical Sunlight and Bergonie Co., Ltd. (207,154).—Private company. Registered July 9th. Capital, £750 in £1 shares. Objects: To acquire the business of an electro-therapeutic institute carried on by Mabel C. Collins at 2, Seaford Court, Great Portland Street, W., and to carry on business as an institute for the treatment of disorders and diseases by electricity, electric, or other scientific lights or rays in all their applications, and such other treatment of an electrical, medicinal or other nature as may be prescribed by qualified medical men and under their supervision, &c. The directors are:—E. F. Pratt, M.D., 15, Clarges Street, W., permanent chairman and managing director; Mrs. E. E. Rechnitzer, 35, Charles Street, W. Qualification, £100. Remuneration as fixed by the company. Secretary: Mrs. M. E. R. Fisher, 10a, Castleton Road, West Kensington, W. Solicitors: John T. Lewis & Woods, 54, Chancery Lane, W.C. Registered office: 54, Chancery Lane, W.C.

Climax Radio Electric, Ltd. (207,078).—Private company. Registered July 4th. Capital, £5,250 in 5,000 7½ per cent. non-cumulative preference shares of £1 and 5,000 ordinary shares of 1s. Objects: To manufacture, erect, maintain, repair and deal in wireless, telegraphic and telephonic apparatus, valves, instruments, equipment, accessories, electrical, magnetic, scientific and radioactive instruments and apparatus, vehicles and buildings for demonstrating and exhibiting the same, and books and literature relating thereto, &c. The life directors are:—C. H. Stave, 182, Church Street, Kensington, electrical engineer (director of Climax Patents, Ltd.); P. W. Baker, 2, Durlston Road, Kingston, electrical engineer; R. M. Ellis, Chop Cherry, Chinnor, Oxon, electrical engineer (director of Climax Patents, Ltd., and Chellis, Ltd.). Qualification, 100 shares. Registered office: 38, Quill Lane, Putney, S.W.15.

Hawk Coil Co., Ltd. (207,105).—Private company. Registered July 6th. Capital, £1,500 in £1 shares. Objects: To acquire the business of manufacturers of and dealers in wireless specialities and components, &c., carried on at St. Mary's Road, Surbiton, as the Hawk Coil Co., together with all or part of the rights, title, and interest in or appertaining to Patent Office Specifications, No. 20,283, relating to inductance coils, and No. 25,371, relating to wireless receiving apparatus (both 1924), and also the registered trade mark "Hawk," No. 421,325. The directors are:—R. J. Coley, 189, Richmond Road, Kingston-on-Thames, engineer; H. J. Rochester, 13, Adelaide Road, Richmond, secretary. Qualification: £5. Secretary: H. J. Rochester. Registered office: St. Mary's Road, Surbiton.

Official Returns of Electrical Companies.

Horstman, Ltd. — Mortgage on deeds and documents mentioned in the schedule thereto, premises, plant, machinery, and the company's undertaking and property, present and future, including uncalled capital, dated June 29th, 1925; to secure all moneys due or to become due from the company to Lloyd's Bank, Ltd.

Mersey Power Co., Ltd.—Security, constituting a second charge on the company's undertaking and property, present and future, including uncalled capital, dated June 23rd, 1925, to secure all moneys due or to become due from the company to the Westminster Bank, Ltd., not exceeding £200,000, ranking after first charge dated November 27th, 1918.

Altrincham Electric Supply, Ltd.—Second mortgage debenture dated June 24th, 1925, to secure £100,000 charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Solicitor to H.M. Treasury.

Rose Bros. Electrical Co., Ltd.—Particulars filed of £3,000 debentures authorised July 1st, 1925, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £1,000.

Rushden and District Electric Supply Co., Ltd.—Issue on June 25th, 1925, of £25,000 debentures, part of a series already registered.

Vaughan Crane Co., Ltd.—Satisfaction in full on June 29th, 1925, of mortgage and debenture dated April 17th, 1900, securing £5,000.

Brotherton Ediswan Tubes and Conduits, Ltd.—R. H. Johnston, of 49, Queen Street, Wolverhampton, ceased to act as receiver or manager on June 13th, 1925, in respect of the appointments of June 14th, 1922, and October 16th, 1924.

City Notes.

Reports and Meetings of Electrical Companies; Dividend Results, &c.

General Electric Co., Ltd.

The annual general meeting was held on July 8th at Magnet House, Kingsway, Sir Hugo Hirst, Bt., presiding. In moving the adoption of the report (*vide* ELEC. REV., June 26th, p. 1026) the chairman said that the company had overcome the difficulties caused by the aftermath of the war. They felt some sense of pride that their prevision as to the services which the electrical industry could render had been justified by their expanding business and corresponding results. The profits, which for the first time in their history exceeded the million-pound mark, were nearly £200,000 in excess of those of last year. Those results were not only due to a greater demand for their goods: they reflected also the increasing efficiency of their recent enterprises, but they were mainly due to the comparative industrial calm which they had enjoyed during the last 12 months. The balance sheet showed great improvement. The items freehold land and buildings and fixed plant and machinery remained stationary as, by a coincidence, depreciations and additions equalised. They were able to keep loose plant, fixtures and installations and goodwill and patents at the nominal sum of £1, which was most satisfactory considering the enhancement of the value of the latter owing to the creation of their research laboratories and the generous allocation made to them. The outstanding feature on the credit side of the balance sheet was the disappearance of the item premium on purchase of Fraser & Chalmers, amounting to £110,000, and the item expenses of debenture stock issue amounting to £409,000. Their liquid resources had increased by nearly £600,000, a very considerable amount, but none too big for the opportunities of re-investment which the progress of the electrical industry would demand—certainly none too big whilst they carried the present onerous load of their debenture issue. He hoped that, at not too distant a date, it might be possible to lighten that charge by some means. If things continued as they had every reason to hope they would, the ordinary shareholders would in the long run be rewarded for their restraint but a concern such as theirs, which was assuming great national importance, must first of all fight for absolute safety. They had to realise that they were employing directly approximately 20,000 workers, apart from those engaged in other industries and in distribution. They must realise that in the electrical industry new ideas were constantly being evolved and capital must be available to study and develop them. The value to the community at large of a company like theirs showed itself in other directions. The quality of its productions was mainly based on home raw material and home labour: what they produced did really add substantially to the wealth of the country. Their exports, amounting to several millions, were much more valuable exports than those of much bigger concerns who must, by the nature of their business, rely largely on importation. They had by no means

arrived at the limit of their possibilities. Though the company was formed in 1889 with a capital of £30,000 and had to-day a capital of £9,000,000, he felt that, electrically speaking, they were still only at the beginning of things. The supply of electricity in the London area by some 70 or 80 authorities had involved a capital expenditure of over 30 millions. If the engineers of those authorities were given the chance of a modern lay-out of a big power station, they could, for less than half that capital, give a bigger output at a considerably reduced cost of production. That was just an indication of what would happen sooner or later to 90 per cent. of the existing power stations in the country. They could imagine how reduced cost of production would stimulate the application of electrical apparatus in industrial and private service. There was an enormous scope in the telephone industry, one of the essential means of modern communication. Great Britain was very much behind in this respect. Good reasons could be given for that slow development but an industrial trading country, such as Great Britain, had no business to be so low down in the scale, and he was glad to know that the Government had realised for some time the need for speeding up a big development programme. The company was well equipped to meet the demand for automatic or any other kind of telephone service. A similar state of affairs existed still in the lighting industry. The improvement of lamps and the study of better lighting methods had led to a considerable increase in the use of electric light during the last few years, and he was satisfied that the combined efforts of the industry to educate the public in the proper use of lighting, how to light houses, shops, streets and factories, would mean a considerable growth of that industry in which they held an important place. Similar pictures could be painted of every other branch of the electrical industry—domestic or industrial. Last year he dwelt on their hopes of what railway electrification, ship propulsion, &c., had in store for them. But of course it was impossible to expect continued prosperity of one industry, however qualified that industry might be for progress, if the rest of the country was ailing. It would be wrong not to admit that this country was suffering from many ailments. Unless we worked as hard as other nations and as efficiently, we must drift farther back. Our prosperity depended upon the possibility of a big export. The recent investigation which his colleague, Mr. Railing, and he had made of working conditions on the Continent, satisfied them that most industries in most Continental countries worked up to 55 hours and more. Whilst there was such a tremendous difference in the working hours of our people compared with the foreigner, our greater skill and efficiency could not make up the difference: we must realise that we must meet the situation in this direction somehow, particularly in the basic industries of coal, steel and iron on which almost every other industry depended. Even, however, if we settled all our difficulties, even if we worked as long as the foreigner, he still felt that the power of production was too great for the absorbing power of the world at the present moment. The great needs of the war developed the power of production of each country to at least double what it required: if wild competition between countries was allowed to go on unchecked, it would lead to political difficulties and to great industrial crises, first in the weaker countries, but eventually to the detriment of all, and particularly to the detriment of the wage earners. He could not but feel that the big industries of the principal countries would have to put their heads together in a spirit of collaboration rather than in a spirit of the "survival of the fittest." They would have to discuss standardisation, working conditions and sharing of markets. Only by such collaboration could industrial steadiness gradually be obtained, and the steady recovery of the world be helped. Mr. E. G. Byng seconded the motion, which was carried without discussion.

Crompton and Co., Ltd.

The annual general meeting was held on July 9th, Mr. A. A. Campbell Swinton, F.R.S., presiding. In proposing the adoption of the report (*vide* our last issue, p.769), the chairman said that last year they were only able to show a small profit amounting to £1,713, after paying debenture interest, &c. This year they showed a profit of £20,316, which although not entirely satisfactory was a distinct improvement. During the year their turnover had increased, but on the whole at lower prices. Competition, particularly in the export trade, was making it difficult to secure business at remunerative figures, and he saw little prospect of getting satisfactory prices until trade conditions abroad improved generally. There were distinct signs of improvement in the case of one of the most important of their overseas connections. With regard to the home trade the depression in the colliery, iron and steel, and shipbuilding industries naturally had an adverse affect on other trades and they could hardly look for an all-round improvement until the position of those important industries changed for the better. Another very important factor influencing the trade of the country was the high cost of living and high wages paid, particularly to unskilled labour in protected trades. A reduction in those two items, which were interdependent was very necessary. High wages and a high cost of living were just as much a disadvantage to the working classes as they were to the trading community. They commenced the current year with very nearly the same volume of orders in hand as they had at the commencement of last year. He hesitated to express any opinion as to the probable profits for the current year, as so much depended upon their output, which in turn depended upon the volume of orders that they might be able to secure. That part of their works at Chelmsford which before the war was used for the manufacture of arc lamps was fully employed while the war lasted on orders for searchlights for the Government. When peace was declared they were faced with the difficulty of finding remunerative work to fill the shop. He was glad to say that their efforts in that direction had met with success and at the present time the whole shop was occupied in the manufacture of instruments, switchgear of all descriptions, small motors, &c., and they were actually employing more men than they had ever employed before. Although in some cases the prices obtained for the goods manufactured there were not all they could desire, they would appreciate that when the shop was occupied to its full capacity their costs automatically came down, with a corresponding rise in their percentage of profits. In their main shop they were at present unable to obtain as many orders as they wanted for standard industrial motors. The company's patent auto-synchronous motor, which was of particular interest to station engineers desirous of improving their load factor, had met with a good deal of success and they were receiving many repeat orders for it. The board would have liked to have been able to recommend a dividend on the ordinary shares, but after careful consideration it had been thought wiser to adopt a conservative policy and carry the balance forward.

Victoria Falls and Transvaal Power Co., Ltd.

The report for the year ended December 31st, 1924, states that after providing for debenture interest and premium (£145,268) and depreciation and income tax (£382,423), there remains a net profit of £349,853: to this is added £105,094 brought forward, making £454,947. Preference dividends totalling 10 per cent. for the year have been paid and the ordinary shares have received a total of 12½ per cent.; £50,000 is transferred to reserve; and the balance (£117,657) is carried forward. At the close of the year the share capital amounted to £3,000,000, and the debentures outstanding to £2,264,190, a total of £95,480 having been redeemed during the year. A dividend of 3 per cent. has been declared on the preference shares in respect of the first half of the current year. Meeting, July 23rd.

Fuller's United Electric Works, Ltd.

The net trading profit for the year ended March 31st last was £31,027, to this was added £1,495 brought forward, making £32,522. Provision is made for debenture interest, depreciation, reconstruction costs, and doubtful debts and a balance of £2,602 is carried forward. The last accounts covered a period of 14 months and showed a net profit of £19,109. The report shows that in spite of the prevailing bad trade conditions the company's trading increased by a third. The company has extended its operations owing to the carrying out of the important developments foreshadowed in the last report; these developments are expected to continue on a satisfactory basis.

French Companies.

The *Compagnie pour l'Exploitation en France des Téléphones Automatiques* reports a loss for 1924.

The *Compagnie d'Electricité Industrielle*, of Paris, while recording a large increase in the turnover in 1924, reports a loss for the year.

The *Ateliers de Constructions Electriques de Lyon et du Dauphine* reports an increase of 35 per cent. in the turnover in 1924 and a further advance has taken place in the current year. The accounts, however, show a loss on working in 1924.

The report of the *Compagnie Française Thomson-Houston*, which has carried forward the balance of net profits earned last year, states that 1924 witnessed the completion of the programme entered upon in 1919 for the regrouping of the works and the establishment of new works. While the first half of 1924 was characterised by progress in all branches, the State Treasury crisis and the crisis in the paper security market suddenly caused a suspension of the large schemes which had been marked for immediate execution. The shops producing plant for the railway electrification were the principal sufferers from this situation. Notwithstanding this, a considerable stream of work was maintained, and the orders booked since the beginning of 1925 represent an increase of 25 per cent. over those in the corresponding period of 1924. But the industry could not hope to progress in the near future unless its chief customers were able to procure the necessary capital. With this object the company had participated in the constitution of the Société Financière pour le Developpement de l'Electricité en France, which had since received applications representing over 300,000,000 fr. It had also been considered necessary to extend the services which were entrusted with the development of the export trade, and the telephone business had been transferred to a special company.

The *Compagnie Française des Câbles Télégraphiques* reports an increase in net profits from 5,445,000 fr. in 1923 to 6,036,000 fr. last year. It is proposed to raise the rate of distribution on the ordinary shares from 24.95 fr. per share to 26.71 fr. per share.

La Société d'Eclairage et de Force par l'Electricité, of Paris, reports a net profit of 2,118,711 fr. for the last financial year, as compared with 1,397,086 fr. in 1923.

Belgian Companies.

The *Société Intercommunale Belge d'Electricité*, of Brussels, is increasing its capital to the extent of 35,000,000 fr., and has invited applications from existing shareholders for 70,000 new shares of 500 fr. each, at 700 fr. each.

La Société de l'Electricité du Bassin de Charleroi is increasing its capital from 14 to 15 million fr.

German Companies.

The *Prometheus Electric Heating Apparatus Company*, of Frankfort-on-Main, which is associated with the Voigt and Haeffner Company, has carried forward the net profits of 20,000 marks earned in 1924. Export prices last year resulted in a loss, and efforts to adapt the export prices to the costs of production have led to a complete stagnation in the foreign trade.

The *North German Cable Works Company*, of Berlin, states that the degree of activity in the second half of 1924 was favourable. Out of the net profits of 100,000 marks it is intended to pay a dividend at the rate of 5 per cent. on the share capital of 1,750,000 marks. The present course of business is stated to be favourable.

The *C. Lorenz Telephone and Telegraph Works Company*, of Berlin, reports that home orders were satisfactory last year, but export orders were scarce. Contracts for automatic telephone stations were entered into with the Reich authorities and orders were booked for radio transmitting stations, but business in receiving apparatus was difficult owing to competition. It is proposed to pay a dividend at the rate of 10 per cent. out of net profits of 788,000 marks on share capital of 6,270,000 marks.

The *High-Frequency Machine Co.*, of Berlin, states that, as compared with a liquidation value of 2,600,000 marks of the holding of Marconi shares the Reich Government has paid 6,817 marks as compensation, and the total amount of the compensation obtainable has been put by the Ministry of Finance at 16,000 marks. The comparatively small claims on America have not yet been settled. A dividend at the rate of 6 per cent. has been declared out of net profits of 86,000 marks for 1924.

The *Saxony Light and Power Works Co.*, of Dresden, states that the dullness of business in the first half of 1924 led to severe competition and frequently inadequate prices. It was only in the second half that conditions improved. After writing off 651,000 marks for depreciation, a dividend at the rate of 7 per cent. has been declared on the preference shares.

The *Baden Electricity Company*, of Mannheim, reports that orders were unsatisfactory in 1924, large constructional contracts frequently failing to mature owing to the impossibility of prospective customers to finance them. The small profits earned last year have been carried forward. An improvement in the orders booked has taken place this year, affording occupation for a long time forward.

The *Robert Bosch Company*, of Stuttgart, reports a considerable increase in the turnover last year; the diminution in the home trade was compensated for by an increase in the exports. The turnover of the companies representing the German company in England and the United States further improved; altogether the company now has 21 sales houses abroad. The accounts record a net profit of 7 940,000 marks and the dividend is at the rate of 8 per cent. for 1924.

Austrian Companies.

The *A.E.G.-Union Electricity Company*, of Vienna, states that development in 1924 was hindered by the general economic situation and by a two months' stoppage through a strike. The export trade was hampered by the isolation measures of the Succession States, but despite this fact the turnover rose to the level of the best pre-war year, the home sales compensating for the deficiency in the exports. The paper net profits allow of the payment of a dividend at the rate of 4,000 crowns per share as in the previous year.

The report of the *Felten and Guilleaume Company*, of Vienna, states that a slight improvement took place in the home sales in 1924, but the export trade declined, oversea deliveries in particular having been difficult to carry out since the end of the crisis in the Ruhr. The net profits permit of an increase in the rate of dividend from 15,000 paper crowns per share in 1923 to 20,000 crowns last year. As to the present year it is stated that the not too favourable prospects manifested at the beginning have now changed for the better.

The *A.E.G. Union Electricitäts Gesellschaft*, of Vienna, reports a net profit of 8,774 million crowns for the last financial year, as compared with 8,219 million crowns in 1923. It is stated that the company has negotiated a loan of 1½ million dollars with an American financial group to bear interest at 7½ per cent. per annum and to be repaid within 20 years.

British Broadcasting Co., Ltd.—The second annual report of this company shows that the amount received in respect of licence fees during the year ended March 31st last was £488,881. In the last accounts, covering a period of 15 months, the amount was only £176,934. After allocating £10,000 to the staff provident fund and reserving £28,400 for taxation, there was a profit of £84,857. The maximum dividend (7½ per cent.) is paid, and a balance of £79,685 is carried forward. It is stated that the surplus is only a "paper" one, as about £59,000 has already been utilised in the construction and improvement of stations. The meeting was to be held yesterday (Thursday).

Altrincham Electric Supply, Ltd.—The report for the year ended December 31st, 1924, records net profits of £23,348. The balance, after deducting directors' fees and preference dividends, was £19,939. It was proposed to transfer £14,000 to reserve and to pay dividends of 7½ per cent. on the ordinary shares and 5s. per share on the deferred shares, as in the previous year.

Petters, Ltd.—Out of the net profit of £30,884 for the past year (including £5,797 brought forward) it is proposed to pay the preference dividend for a further six months, leaving it three years in arrear. The reserve fund receives £20,000 and £24,908 is carried forward. The report states that the improvement in the company's position is continuing. A meeting is to be held on July 23rd for the purpose of considering proposals for the issue of funding certificates to the preference shareholders in satisfaction of the arrears of dividend, amounting to £45,000.

Stock Exchange Notices.—Dealings in the following have been specially allowed by the Committee under Rule 159:—

Adelaide Electric Supply Co.—181,322 six and a-half per cent. "C" cumulative preference shares of £1 each, fully paid, Nos. 68,679 to 250,000.

County of London Electric Supply Co.—826,500 new six per cent. cumulative preference shares of £1 each, issued at £1 0s. 6d. per share, fully paid, Nos. 2,725,001 to 3,551,500 (conversion shares); 1,173,500 new six per cent. cumulative preference shares of £1 each, issued at £1 0s. 6d. per share, partly paid and fully paid, Nos. 3,551,501 to 4,725,000 (instalment shares).

Rees Roturbo Manufacturing Co., Ltd.—The accounts for the year ended September 30th, 1924, show a loss of £1,922 after crediting £582 brought forward and £10,000 from reserve. It is stated that the severe competition in home and foreign markets has resulted in an insufficient volume of orders, and the acceptance of orders at unremunerative prices.

Associated Gas and Electric Co.—A preliminary statement of the results for the year 1924-25, combining the Associated and Manila undertakings, shows a gross revenue of $11,428,461 and net earnings of $4,749,908. After meeting fixed charges, and preferred dividends amounting to $345,698, there remains a balance of $1,738,544 for allocations to reserves and for classes A and B dividends and surplus.

Sligo Lighting and Electric Power Co.—The report for 1924 shows a loss of £800. After providing for preference interest at 4½ per cent. out of a balance from previous account, £1,101 remained at credit of profit and loss and a dividend at the rate of 5 per cent. per annum is recommended on the ordinary shares, leaving £741 to be carried forward.

Greenwood & Batley, Ltd.—The report for the year ended March 31st last records a net profit of £30,679 as compared with £30,237 in 1923-24. Of this amount £6,000 is allocated to depreciation and after the payment of a final ordinary dividend of 2½ per cent. (making 5 per cent. for the year as in the previous year), £15,502 is carried forward. Meeting, July 22nd.

Czecho-Slovakian Companies.—The *Prague Accumulator Co.* is increasing its capital from 6 000,000 to 7,500,000 crowns.

The "*Telegrafia*" *Co.*, of Prague, manufacturers of telegraphic and telephonic apparatus, has declared a dividend of 10 per cent. for last year. The net earnings amounted to 2,058,965 crowns, as compared with 1,753,884 crowns in 1923.

Swiss Companies.—The directors of *Brown, Boveri & Co.*, Baden, are recommending a dividend of 6 per cent. for the year ended March 31st last. The *Société d'Electricité Alioth*, of Basle, an affiliated concern, reports a net profit of 352,000 fr. for the last financial year. The dividend is being maintained at 5 per cent. on the capital of 6 million fr.

The *Société Suisse d'Industrie Electrique*, of Glarus, reports a net profit of 2,636,679 fr. for the last financial year, as compared with 1,790,826 fr. in 1923. The dividend is being increased from 6 to 8 per cent.

Dutch East Indian Company.—The *Allgemeene Nederlandsch-Indische Electriciteit Maatschappij*, of Soerabaya, reports a net profit of 1,302,857 guilders for the last financial year, as compared with 1,174,285 guilders in 1923. The dividend is being increased from 11 to 12 per cent. on a capital of 9 million guilders.

Electrolytic Zinc Co. of Australasia.—The *Financial Times* reports that a dividend at the rate of 12 per cent. has been declared on the preference, ordinary, and deferred ordinary shares in respect of the six months ended June 30th.

Bournemouth and Poole Electricity Supply Co., Ltd.—The following interim dividends have been declared:—Preference shares, 2½ per cent.; second preference shares, 3 per cent.; ordinary shares, 4½ per cent.

Greek Company.—The report of the *Compagnie Hellenique d'Electricité*, of Athens, for last year shows a net profit of only 1,420,995 drachmae, as compared with 2,136,650 drachmae in 1923.

Liverpool Overhead Railway, Ltd.—The directors state that they are unable to declare interim dividends on the preference and ordinary shares.

Dublin United Tramways Co., Ltd.—Interim dividends at the rate of 6 per cent. on the preference stock and 4 per cent. on the ordinary stock have been declared, as in 1924.

Smithfield Markets Electric Supply Co., Ltd.—An interim dividend of 3 per cent. has been declared on the ordinary shares.

Marconi International Marine Communication Co., Ltd.—It is proposed to pay a final dividend of 2½ per cent., making 7½ per cent. for the past year.

Clontarf and Hill of Howth Tramroad Co.—An interim dividend of 3s. per share has been declared, as in 1924.

arrived at the limit of their possibilities. Though the company was formed in 1889 with a capital of £30,000 and had to-day a capital of £9,000,000, he felt that, electrically speaking, they were still only at the beginning of things. The supply of electricity in the London area by some 70 or 80 authorities had involved a capital expenditure of over 30 millions. If the engineers of those authorities were given the chance of a modern lay-out of a big power station, they could, for less than half that capital, give a bigger output at a considerably reduced cost of production. That was just an indication of what would happen sooner or later to 90 per cent. of the existing power stations in the country. They could imagine how reduced cost of production would stimulate the application of electrical apparatus in industrial and private service. There was an enormous scope in the telephone industry, one of the essential means of modern communication. Great Britain was very much behind in this respect. Good reasons could be given for that slow development but an industrial trading country, such as Great Britain, had no business to be so low down in the scale, and he was glad to know that the Government had realised for some time the need for speeding up a big development programme. The company was well equipped to meet the demand for automatic or any other kind of telephone service. A similar state of affairs existed still in the lighting industry. The improvement of lamps and the study of better lighting methods had led to a considerable increase in the use of electric light during the last few years, and he was satisfied that the combined efforts of the industry to educate the public in the proper use of lighting, how to light houses, shops, streets and factories, would mean a considerable growth of that industry in which they held an important place. Similar pictures could be painted of every other branch of the electrical industry—domestic or industrial. Last year he dwelt on their hopes of what railway electrification, ship propulsion, &c., had in store for them. But of course it was impossible to expect continued prosperity of one industry, however qualified that industry might be for progress, if the rest of the country was ailing. It would be wrong not to admit that this country was suffering from many ailments. Unless we worked as hard as other nations and as efficiently, we must drift farther back. Our prosperity depended upon the possibility of a big export. The recent investigation which his colleague, Mr. Railing, and he had made of working conditions on the Continent, satisfied them that most industries in most Continental countries worked up to 55 hours and more. Whilst there was such a tremendous difference in the working hours of our people compared with the foreigner, our greater skill and efficiency could not make up the difference: we must realise that we must meet the situation in this direction somehow, particularly in the basic industries of coal, steel and iron on which almost every other industry depended. Even, however, if we settled all our difficulties, even if we worked as long as the foreigner, he still felt that the power of production was too great for the absorbing power of the world at the present moment. The great needs of the war developed the power of production of each country to at least double what it required: if wild competition between countries was allowed to go on unchecked, it would lead to political difficulties and to great industrial crises, first in the weaker countries, but eventually to the detriment of all, and particularly to the detriment of the wage earners. He could not but feel that the big industries of the principal countries would have to put their heads together in a spirit of collaboration rather than in a spirit of the "survival of the fittest." They would have to discuss standardisation, working conditions and sharing of markets. Only by such collaboration could industrial steadiness gradually be obtained, and the steady recovery of the world be helped. Mr. E. G. Byng seconded the motion, which was carried without discussion.

Crompton and Co., Ltd.

The annual general meeting was held on July 9th, Mr. A. A. Campbell Swinton, F.R.S., presiding. In proposing the adoption of the report (*vide* our last issue, p. 69), the chairman said that last year they were only able to show a small profit amounting to £1,713, after paying debenture interest, &c. This year they showed a profit of £20,316, which although not entirely satisfactory was a distinct improvement. During the year their turnover had increased, but on the whole at lower prices. Competition, particularly in the export trade, was making it difficult to secure business at remunerative figures, and he saw little prospect of getting satisfactory prices until trade conditions abroad improved generally. There were distinct signs of improvement in the case of one of the most important of their overseas connections. With regard to the home trade the depression in the colliery, iron and steel, and shipbuilding industries naturally had an adverse affect on other trades and they could hardly look for an all-round improvement until the position of those important industries changed for the better. Another very important factor influencing the trade of the country was the high cost of living and high wages paid, particularly to unskilled labour in protected trades. A reduction in those two items, which were interdependent was very necessary. High wages and a high cost of living were just as much a disadvantage to the working classes as they were to the trading community. They commenced the current year with very nearly the same volume of orders in hand as they had at the commencement of last year. He hesitated to express any opinion as to the probable profits for the current year, as so much depended upon their output, which in turn depended upon the volume of orders that they might be able to secure. That part of their works at Chelmsford which before the war was used for the manufacture of arc lamps was fully employed while the war lasted on orders for searchlights for the Government. When peace was declared they were faced with the difficulty of finding remunerative work to fill the shop. He was glad to say that their efforts in that direction had met with success and at the present time the whole shop was occupied in the manufacture of instruments, switchgear of all descriptions, small motors, &c., and they were actually employing more men than they had ever employed before. Although in some cases the prices obtained for the goods manufactured there were not all they could desire, they would appreciate that when the shop was occupied to its full capacity their costs automatically came down, with a corresponding rise in their percentage of profits. In their main shop they were at present unable to obtain as many orders as they wanted for standard industrial motors. The company's patent auto-synchronous motor, which was of particular interest to station engineers desirous of improving their load factor, had met with a good deal of success and they were receiving many repeat orders for it. The board would have liked to have been able to recommend a dividend on the ordinary shares, but after careful consideration it had been thought wiser to adopt a conservative policy and carry the balance forward.

Victoria Falls and Transvaal Power Co., Ltd.

The report for the year ended December 31st, 1924, states that after providing for debenture interest and premium (£145,268) and depreciation and income tax (£382,423), there remains a net profit of £349,853; to this is added £105,094 brought forward, making £454,947. Preference dividends totalling 10 per cent. for the year have been paid and the ordinary shares have received a total of 12½ per cent.; £50,000 is transferred to reserve; and the balance (£117,657) is carried forward. At the close of the year the share capital amounted to £3,000,000, and the debentures outstanding to £2,254,190, a total of £95,480 having been redeemed during the year. A dividend of 3 per cent. has been declared on the preference shares in respect of the first half of the current year. Meeting, July 23rd.

Fuller's United Electric Works, Ltd.

The net trading profit for the year ended March 31st last was £31,027, to this was added £1,495 brought forward, making £32,522. Provision is made for debenture interest, depreciation, reconstruction costs, and doubtful debts and a balance of £2,602 is carried forward. The last accounts covered a period of 14 months and showed a net profit of £19,109. The report shows that in spite of the prevailing bad trade conditions the company's trading increased by a third. The company has extended its operations owing to the carrying out of the important developments foreshadowed in the last report; these developments are expected to continue on a satisfactory basis.

French Companies.

The *Compagnie pour l'Exploitation en France des Téléphones Automatiques* reports a loss for 1924.

The *Compagnie d'Electricité Industrielle*, of Paris, while recording a large increase in the turnover in 1924, reports a loss for the year.

The *Ateliers de Constructions Electriques de Lyon et du Dauphine* reports an increase of 35 per cent. in the turnover in 1924 and a further advance has taken place in the current year. The accounts, however, show a loss on working in 1924.

The report of the *Compagnie Française Thomson-Houston*, which has carried forward the balance of net profits earned last year, states that 1924 witnessed the completion of the programme entered upon in 1919 for the regrouping of the works and the establishment of new works. While the first half of 1924 was characterised by progress in all branches, the State Treasury crisis and the crisis in the paper security market suddenly caused a suspension of the large schemes which had been marked for immediate execution. The shops producing plant for the railway electrification were the principal sufferers from this situation. Notwithstanding this, a considerable stream of work was maintained, and the orders booked since the beginning of 1925 represent an increase of 25 per cent. over those in the corresponding period of 1924. But the industry could not hope to progress in the near future unless its chief customers were able to procure the necessary capital. With this object the company had participated in the constitution of the Société Financière pour le Developpement de l'Electricité en France, which had since received applications representing over 300,000,000 fr. It had also been considered necessary to extend the services which were entrusted with the development of the export trade, and the telephone business had been transferred to a special company.

The *Compagnie Française des Câbles Télégraphiques* reports an increase in net profits from 5,445,000 fr. in 1923 to 6,036,000 fr. last year. It is proposed to raise the rate of distribution on the ordinary shares from 24.95 fr. per share to 26.71 fr. per share.

La Société d'Eclairage et de Force par l'Electricité, of Paris, reports a net profit of 2,118,711 fr. for the last financial year, as compared with 1,397,086 fr. in 1923.

Belgian Companies.

The *Société Intercommunale Belge d'Electricité*, of Brussels, is increasing its capital to the extent of 35,000,000 fr., and has invited applications from existing shareholders for 70,000 new shares of 500 fr. each, at 700 fr. each.

La Société de l'Electricité du Bassin de Charleroi is increasing its capital from 14 to 15 million fr.

German Companies.

The *Prometheus Electric Heating Apparatus Company*, of Frankfort-on-Main, which is associated with the Voigt and Haeffner Company, has carried forward the net profits of 20,000 marks earned in 1924. Export prices last year resulted in a loss, and efforts to adapt the export prices to the costs of production have led to a complete stagnation in the foreign trade.

The *North German Cable Works Company*, of Berlin, states that the degree of activity in the second half of 1924 was favourable. Out of the net profits of 100,000 marks it is intended to pay a dividend at the rate of 5 per cent. on the share capital of 1,750,000 marks. The present course of business is stated to be favourable.

The *C. Lorenz Telephone and Telegraph Works Company*, of Berlin, reports that home orders were satisfactory last year, but export orders were scarce. Contracts for automatic telephone stations were entered into with the Reich authorities and orders were booked for radio transmitting stations, but business in receiving apparatus was difficult owing to competition. It is proposed to pay a dividend at the rate of 10 per cent. out of net profits of 788,000 marks on share capital of 6,270,000 marks.

The *High-Frequency Machine Co.*, of Berlin, states that, as compared with a liquidation value of 2,600,000 marks of the holding of Marconi shares the Reich Government has paid 6,317 marks as compensation, and the total amount of the compensation obtainable has been put by the Ministry of Finance at 16,000 marks. The comparatively small claims on America have not yet been settled. A dividend at the rate of 6 per cent. has been declared out of net profits of 86,000 marks for 1924.

The *Saxony Light and Power Works Co.*, of Dresden, states that the dullness of business in the first half of 1924 led to severe competition and frequently inadequate prices. It was only in the second half that conditions improved. After writing off 651,000 marks for depreciation, a dividend at the rate of 7 per cent. has been declared on the preference shares.

The *Baden Electricity Company*, of Mannheim, reports that orders were unsatisfactory in 1924, large constructional contracts frequently failing to mature owing to the impossibility of prospective customers to finance them. The small profits earned last year have been carried forward. An improvement in the orders booked has taken place this year, affording occupation for a long time forward.

The *Robert Bosch Company*, of Stuttgart, reports a considerable increase in the turnover last year; the diminution in the home trade was compensated for by an increase in the exports. The turnover of the companies representing the German company in England and the United States further improved; altogether the company now has 21 sales houses abroad. The accounts record a net profit of 7 940,000 marks and the dividend is at the rate of 8 per cent. for 1924.

Austrian Companies.

The *A.E.G.-Union Electricity Company*, of Vienna, states that development in 1924 was hindered by the general economic situation and by a two months' stoppage through a strike. The export trade was hampered by the isolation measures of the Succession States, but despite this fact the turnover rose to the level of the best pre-war year, the home sales compensating for the deficiency in the exports. The paper net profits allow of the payment of a dividend at the rate of 4,000 crowns per share as in the previous year.

The report of the *Felten and Guilleaume Company*, of Vienna, states that a slight improvement took place in the home sales in 1924, but the export trade declined, oversea deliveries in particular having been difficult to carry out since the end of the crisis in the Ruhr. The net profits permit of an increase in the rate of dividend from 15,000 paper crowns per share in 1923 to 20,000 crowns last year. As to the present year it is stated that the not too favourable prospects manifested at the beginning have now changed for the better.

The *A.E.G. Union Electricitäts Gesellschaft*, of Vienna, reports a net profit of 8,774 million crowns for the last financial year, as compared with 8,219 million crowns in 1923. It is stated that the company has negotiated a loan of 1½ million dollars with an American financial group to bear interest at 7½ per cent. per annum and to be repaid within 20 years.

British Broadcasting Co., Ltd.—The second annual report of this company shows that the amount received in respect of licence fees during the year ended March 31st last was £488,881. In the last accounts, covering a period of 15 months, the amount was only £176,934. After allocating £10,000 to the staff provident fund and reserving £28,400 for taxation, there was a profit of £84,857. The maximum dividend (7½ per cent.) is paid, and a balance of £79,685 is carried forward. It is stated that the surplus is only a "paper" one, as about £59,000 has already been utilised in the construction and improvement of stations. The meeting was to be held yesterday (Thursday).

Altrincham Electric Supply, Ltd.—The report for the year ended December 31st, 1924, records net profits of £23,348. The balance, after deducting directors' fees and preference dividends, was £19,939. It was proposed to transfer £14,000 to reserve and to pay dividends of 7½ per cent. on the ordinary shares and 5s. per share on the deferred shares, as in the previous year.

Petters, Ltd.—Out of the net profit of £30,884 for the past year (including £5,797 brought forward) it is proposed to pay the preference dividend for a further six months, leaving it three years in arrear. The reserve fund receives £20,000 and £24,908 is carried forward. The report states that the improvement in the company's position is continuing. A meeting is to be held on July 23rd for the purpose of considering proposals for the issue of funding certificates to the preference shareholders in satisfaction of the arrears of dividend, amounting to £45,000.

Stock Exchange Notices.—Dealings in the following have been specially allowed by the Committee under Rule 159:—

Adelaide Electric Supply Co.—181,322 six and a-half per cent. "C" cumulative preference shares of £1 each, fully paid, Nos. 68,679 to 250,000.

County of London Electric Supply Co.—826,500 new six per cent. cumulative preference shares of £1 each, issued at £1 0s. 6d. per share, fully paid, Nos. 2,725,001 to 3,551,500 (conversion shares); 1,173,500 new six per cent. cumulative preference shares of £1 each, issued at £1 0s. 6d. per share, partly paid and fully paid, Nos. 3,551,601 to 4,725,600 (instalment shares).

Rees Roturbo Manufacturing Co., Ltd.—The accounts for the year ended September 30th, 1924, show a loss of £1,922 after crediting £582 brought forward and £10,000 from reserve. It is stated that the severe competition in home and foreign markets has resulted in an insufficient volume of orders, and the acceptance of orders at unremunerative prices.

Associated Gas and Electric Co.—A preliminary statement of the results for the year 1924-25, combining the Associated and Manila undertakings, shows a gross revenue of $11,428,461 and net earnings of $4,749,908. After meeting fixed charges, and preferred dividends amounting to $345,698, there remains a balance of $1,738,544 for allocations to reserves and for classes A and B dividends and surplus.

Sligo Lighting and Electric Power Co.—The report for 1924 shows a loss of £800. After providing for preference interest at 4½ per cent. out of a balance from previous account, £1,101 remained at credit of profit and loss and a dividend at the rate of 5 per cent. per annum is recommended on the ordinary shares, leaving £741 to be carried forward.

Greenwood & Batley, Ltd.—The report for the year ended March 31st last records a net profit of £30,679 as compared with £30,237 in 1923-24. Of this amount £6,000 is allocated to depreciation and after the payment of a final ordinary dividend of 2½ per cent. (making 5 per cent. for the year as in the previous year), £15,502 is carried forward. Meeting, July 22nd.

Czecho-Slovakian Companies.—The *Prague Accumulator Co.* is increasing its capital from 6 000,000 to 7,500,000 crowns.

The "*Telegrafia*" *Co.*, of Prague, manufacturers of telegraphic and telephonic apparatus, has declared a dividend of 10 per cent. for last year. The net earnings amounted to 2,058,905 crowns, as compared with 1,753,884 crowns in 1923.

Swiss Companies.—The directors of *Brown, Boveri & Co.*, Baden, are recommending a dividend of 6 per cent. for the year ended March 31st last. The *Société d'Electricité Alioth*, of Basle, an affiliated concern, reports a net profit of 352,000 fr. for the last financial year. The dividend is being maintained at 5 per cent. on the capital of 6 million fr.

The *Société Suisse d'Industrie Electrique*, of Glarus, reports a net profit of 2,636,679 fr. for the last financial year, as compared with 1,790,825 fr. in 1923. The dividend is being increased from 6 to 8 per cent.

Dutch East Indian Company.—The *Allgemeene Nederlandsch-Indische Electriciteit Maatschappij*, of Soerabaya, reports a net profit of 1,302,857 guilders for the last financial year, as compared with 1,174,285 guilders in 1923. The dividend is being increased from 11 to 12 per cent. on a capital of 9 million guilders.

Electrolytic Zinc Co. of Australasia.—The *Financial Times* reports that a dividend at the rate of 12 per cent. has been declared on the preference, ordinary, and deferred ordinary shares in respect of the six months ended June 30th.

Bournemouth and Poole Electricity Supply Co., Ltd.—The following interim dividends have been declared:—Preference shares, 2½ per cent.; second preference shares, 3 per cent.; ordinary shares, 4½ per cent.

Greek Company.—The report of the *Compagnie Hellenique d'Electricité*, of Athens, for last year shows a net profit of only 1,420,995 drachmae, as compared with 2,136,650 drachmae in 1923.

Liverpool Overhead Railway, Ltd.—The directors state that they are unable to declare interim dividends on the preference and ordinary shares.

Dublin United Tramways Co., Ltd.—Interim dividends at the rate of 6 per cent. on the preference stock and 4 per cent. on the ordinary stock have been declared, as in 1924.

Smithfield Markets Electric Supply Co., Ltd.—An interim dividend of 3 per cent. has been declared on the ordinary shares.

Marconi International Marine Communication Co., Ltd.—It is proposed to pay a final dividend of 2½ per cent., making 7½ per cent. for the past year.

Clontarf and Hill of Howth Tramroad Co.—An interim dividend of 3s. per share has been declared, as in 1924.

Stocks and Shares.

MONDAY EVENING.

THE rubber boom is the feature of the Stock Exchange markets at the present time. All departments are subservient to the one popular market in which thousands of people are taking an interest. Stocks and shares in other investments are being sold in order that their possessors may engage in the rubber excitement. Those who are called upon to deal with the business in rubber shares find their energies taxed to the physical utmost in order to keep pace with the demands made upon them. The crisis that has developed in the mining and the railway industries has the effect of causing restraint upon business in the shares of companies connected either nearly or remotely with those two branches of trade.

The War Loan keeps steadily at about 100 and sets the tone to purely investment securities. The recent torrent of new issues which threatened the prices of sound securities, and brought about a moderate fall in many gilt-edged stocks, has been stayed, and the floating supply is being taken by the permanent investor, with the result that prices show a faint tendency to improve. However, there is talk of a renewal of the new issue plethora in the near future, before the holiday season starts in real earnest.

Electricity supply shares are disposed to be dull; it is argued that the industry stands to be unfavourably affected by the disputes in the coal and railway worlds alike. City Lights are a trifle easier, and several other shares show moderate declines. Bournemouth and Poole rose to 56s. 3d., and County of London Electric recovered to 53s. Allotment letters in respect of the new County preference came out this week. The shares were heavily over-subscribed, and the price opened at a small premium over and above the 20s. 6d. at which they were offered. Shareholders received preferential treatment in an allotment conducted upon very just and reasonable lines. In such matters, however, all experience teaches that to please everybody is a sheer impossibility.

Victoria Falls and Transvaal Power ordinary shares have risen to 43s. 6d. on the increase in the dividend to 12½ per cent. The company's annual report seldom errs on the side of diffuseness, and the present document maintains the usual tradition. The figures are, however, decidedly satisfactory, and shareholders will anticipate, with reason, a higher figure for their interests.

Edmundsons' report records a favourable past year, the profits again showing material improvement. The company is building up a strong reserve. While the ordinary shares are unchanged at 23s., the preference have recovered the dividend deducted last week.

The British Broadcasting Co. is going ahead by leaps and bounds. Last year's gross revenue of over half a million sterling was 2½ times greater than that shown by the accounts of the previous fifteen-month period. As the dividend on the cumulative ordinary shares is not allowed to exceed 7½ per cent., the benefit of the surplus goes very largely to the owners of wireless sets. For one thing, nearly £60,000 has been spent during the past year upon the stations, new and less new, and more money is to be laid out in the same way in the year now current. Marconi shares are dullish at 27s. 6d., and Marconi Marines fell, the other day, to 18s. 9d., though the price rallied nominally to £1. The fall led to uneasiness as to what the forthcoming dividend declaration is likely to prove.

Cable stocks are somewhat heavy. Western Telegraphs rose to 16¼, shares being picked up by people who changed into them from Eastern Extensions and Globe ordinary. The dividends upon all these, as upon Eastern ordinary, are 10 per cent., free of tax; duly marked, by the way, in our tables. This serves as a reminder—also by the way—that the indicative asterisk against the Siemens dividend last week must have crept in, may it be charitably supposed, as the result of a printer's error. The last dividend was paid less tax.

Siemens are a few pence lower at 25s. General Electric ordinary, quoted ex-dividend, are 24s. middle. At this price the yield on the money comes to 6¼ per cent., on the basis of the lately-declared 7½ per cent. dividend. At the company's meeting last week, the chairman spoke in vein, prophetically optimistic, of the increasing activities that must lie in front of an industry which he sees is but in its infancy. Sir Hugo Hirst's speech displayed a breadth of vision that will appeal to those who can foresee the extraordinary developments that lie ahead of electrical expansion when it escapes from the parochialism and pettiness that have fretted its energies in the past, and the effect of which still hampers its progress. Brush ordinary went back to 19s. 6d. British Aluminium hardened to 28s. 9d. Callenders are 1/16th off to 2⅛, and Telegraph Constructions at 26½, while quotably 10s. lower, are ex the dividend of 6s. net.

British Columbia Electric deferred and preferred are both 3 points down. Mexican Light preferred shed 2, to 59. Brazilian Tractions at 58 are 1½ higher, and Anglo-Argentine Trams show a firmer tone. In the London traction list, London and Suburban preference fell back to 5s.

Home Rails are heavy and dispirited. Metropolitan Consolidated has gone down to 68½; Underground shilling shares to 7s. Districts at 45½ are ex dividend. The market is weak all round. Investors have been selling their Home Rails in order to buy rubber shares. The exuberance in the market for these latter grew intense. Business has broadened out into boom conditions. People have been speculating in names, and gambling upon the price of the produce. It is all very exhilarating, exhausting, and exciting while it lasts.

Share List of Electrical Companies.

	Nom. £	Dividend. 1923.	Dividend. 1924.	Price July 13, 1925.	Rise or fall.	Yield p.c.
HOME ELECTRICITY COMPANIES						
Bournemouth and Poole	1	13	14	21/8	+ 1/8	5 6 8
Brompton Ordinary	1	10	10	12	—	*5 14 8
Charing Cross Ordinary	1	14½	15	46/9	—	6 6 3
do. do. do. 4½ Pref.	1	4½	4½	17/6	—	5 3 10
Chelsea	1	12	12	1⅝	—	6 8 6
City of London	1	15	15	45/9	— 1/8	5 1 2
do. do. 6% Pref.	1	6	6	23/	—	5 4 4
Clyde Valley	1	6	6	21/-	—	5 3 3
County of London	1	15	15	53/-	+ 6d.	5 13 3
do. do. 6% Pref.	1	6	6	22/6		5 6 8
Edmundson's Ordinary	1	7	7	23/-	—	6 1 9
do. 7% Pref.	1	6	7	22/ xd	+ 3d.	6 7 3
Elec. Supply Corporation	1	10	10	33/3	—	6 0 4
Kensington Ordinary	5	14	15	12¾	—	5 16 6
Lancs. Light and Power	1	7½	7½	25 6	- 1/-	5 17 8
London Electric	1	10	10	31/-	- 1/-	5 17 8
do. do. 6% Pref.	5	6	6	5½	—	5 6 8
Metropolitan	1	10	11	33/3	—	5 18 0
do. 4½% Pref.	1	4½	4½	17/-	—	5 5 11
Midland Counties	1	5½	6	23/3	—	5 4 4
Newcastle-on-Tyne Ordinary	1	6	7	12/6	+ 6d.	6 4 5
do. 5% Pref.	1	5	5	18/3	—	5 9 7
do. 7% Pref.	1	7	7	24/-	- 1/-	5 16 8
Notting Hill 6% Pref.	10	6	6	10	—	6 0 0
North Met. Elec. 6% Pref.	1	6	6	22/-	—	5 9 1
St. James' and Pall Mall	5	17½	17½	18⅝	— ¼	6 8 5
South London	1	15	15	2⅞	—	6 3 1
South Metropolitan Pref.		7	7	1¼	—	5 12 6
Urban Ordinary	1	4	4	17/-	—	4 14 3
do. 6% Pref.	1	6	6	20/-	—	6 0 0
Westminster Ordinary	1	15	15	45/6	- 1/-	6 6 4
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	19/6	—	7 14 10
Yorkshire Elec.	1	8	8	31/-	—	5 3 3
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	68	—	5 17 8
Metropolitan	,,	4	5	68½	- 1½	7 6 0
do District	,,	3½	3½	45½xd	—	7 13 10
Underground Electric Ordinary	10	Nil	Nil	2½	—	Nil
do. do. "A"	1/-	Nil	Nil	7/-	- 1d.	Nil
do. do. Income	Bonds	5	5	98	—	*5 2 5
TELEGRAPHS AND TELEPHONES.						
Anglo-Am. Tel. Pref.	Stock	6	6	104½	— ½	5 14 12
do. Def.	,,	1½	1½	24¼	—	6 3 9
Automatic Telephone	1	3	6	2⅛	—	2 18 2
Chili Telephone	5	5	5	5⅛	—	*5 10 4
Cuba Sub. Ord.	10	5	5	6¾	—	7 8 2
Eastern Extension	10	10	10	17xd	—	*5 17 8
Eastern Tel. Ord.	Stock	10	10	172½xd	—	*5 15 11
Globe Tel. and T. Ord.	10	10	10	17½	—	*5 14 2
do. do. Pref.	10	6	6	11⅞	—	5 10 4
Great Northern Tel.	10	22	22	31	— ½	7 1 11
Indo-European	25	7	8½	41½	—	*4 4 4
Marconi	1	10	—	1⅛	—	5 19 2
Marconi Marine	1	10	—	1	—	10 0 0
Oriental Telephone Ord.	1	12	12	9½	—	*5 13 11
United R. Plate Tel.	5	8	8	7½	—	*5 12 3
Western Telegraph	10	10	10	16¼	+ ¼	*6 3 1
HOME AND FOREIGN TRAMS, &c.						
Anglo-Arg. Trams First Pref.	5	5½	5½	8½	—	8 16 0
do. do. 2nd Pref.	5	6	6	9½	+ ⅛	10 4 4
do. do. 5% Deb.	Stock	5	7	73	—1	6 15 2
British Electric Traction Ord.	,,	6	6	112	—	5 7 2
do. do. 6% Pref.	,,	6	6	104	—	5 15 5
Brazil Traction	100	4	4	58	+1½	6 17 11
Brit. Columbia Elec. Rly. Pcs.	Stock	5	5	£9½xd	—	5 11 9
do. do. Preferred	,,	90/-	90/-	83½	—3	*5 15 0
do. do. Deferred	,,	129/5	129/5	109½	— 8	*6 5 0
do. do. Deb.	,,	4½	4½	75½	—	5 13 7
Lond. & Sub. Trac. 5% Pref.	1	2½	—	5/-	- 1/-	Nil
London United Tram. Deb.	Stock	4	4	42½	—	9 8 4
Mexico Trams, 5% Bonds	—	5	5	62½	—	8 0 0
Mexican Light Common	100	Nil	Nil	25	—	Nil
do. Pref.	100	Nil	Nil	59	— 2	Nil
do. 1st Bonds	—	5	5	65½	—	7 12 4
Yorkshire (West Riding)	1	5	—	18/9	—	5 5 8
MANUFACTURING COMPANIES.						
Babcock & Wilcox	1	12	12	2⅞	—	*4 18 6
British Aluminium Ord.	1	5	10	28/9	—6d.	6 19 2
British Elec. Transformer Pref.	1	Nil	7	17/6	—	... ...
British Insulated Ord.	1	15	15	8½	—	4 10 8
Brush Ord.	1	10	10	19/6	—6d.	10 5 2
Callenders	1	15	15	2⅛	— ⅛	5 4 4
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 3
Crompton Ord.	1	Nil	Nil	⅜	—	...
Edison-Swan	4/-	10	10	8/-	—	5 0 0
do. 5% Deb.	Stock	5	5	80½	—	6 4 3
Electric Construction	1	10	10	1⅝	—	6 3 1
Enfield Cable, Pref.	1	7½	7½	1¼	—	5 ...
English Electric	1	5	5	18/9	—	5 6 8
do. do. Pref.	1	6	6	21/-	—	5 14 3
Gen. Elec. Pref.	1	6½	6½	23/6	—	5 10 9
do. Ord.	1	5	7½	24/-xd	—	6 5 0
Henley	1	15	16	3	—	5 0 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 9
India-Rubber	1	5	5	1	—	*5 0 0
Johnson & Phillips	1	10	10	2⅛	—	4 17 0
Met-Vickers, Ord.	1	8	8	21/8	—	7 0 7
do. Pref.	2	8	8	2⅜	—	6 14 3
Siemens Ord.	1	—	5	24/-	—6d.	4 0 0
Telegraph Construction	12	20	20	2 ½xd	—	4 10 0

* Dividends paid free of Income Tax.

The First International Congress of Radiology.

International Units and Standards.

(*Continued from p. 50.*)

DR. SIDNEY RUSS (Middlesex Hospital, London) said that, although it should not be long before they had a system of international units, there appeared to be a little difference of opinion between English and German physicists as to what was most urgently required. At the same time, he was glad there was unanimity of opinion between those in the various countries as to what should really be measured, *viz.*, the ionisation in air, quite apart from any secondary phenomena which might take place. Although a certain result was obtained with a certain beam of X-rays, it was not known what would happen when another beam of X-rays was allowed to enter the same space, although there might be the same ionisation; that was an obvious difficulty which had to be met, because, although the same actual ionisation with two wave-lengths was obtained, there would not be the same intensity. Therefore, it was necessary to decide upon some definite wave-length as the standard. Again, great difficulties arose when considering a unit of dosage, and even if that were decided upon, they would still be a very long way from specifying the beams that were being used, assuming that the electrostatic charge was that corresponding to the unit of dosage which had been suggested.

DR. GLASSER (United States) referred to the work that was being done by the Standardisation Committee recently appointed by the Radiological Society of North America, and spoke of the construction of ionisation chambers there for the purpose of standardisation.

PROF. W. FRIEDRICH (Frieberg, Germany) said that whilst it would be an ideal thing, from the absolute point of view, to measure the energy of the X-ray and the energy absorbed by any human tissue, the attempts made to do so had not been very successful. Therefore, he agreed with the proposal to form an International Committee to go into the whole problem of units. Perhaps the adoption of a physical unit would be the simplest from the point of view of the radiologist.

DR. HANS HOLFELDER (Frankfurt), referring to certain differences which had been alleged to exist between the tentative standards adopted in France and Germany, suggested that the experimental work carried out in France relating to the comparison between the two systems might not have been done with sufficient exactitude, and said it would be unwise to draw definite conclusions from only one or two comparative experiments, as seemed to have been the case. There was no evidence that the same quality X-rays had been used in the two cases, for instance. The statement had been made that the French dose was 25 times the German dose, but the experimental work should be carefully checked before that statement was accepted.

PROF. H. HOLTHUSEN (Hamburg) urged the necessity for choosing a unit which could be defined as shortly as possible; that was the reason why German scientists had not seen their way to follow what had been suggested by the French workers some years ago. He doubted whether it would be possible to calibrate ionisation chambers by radium having regard to the fact that the ionisation effect of gamma rays in any given instrument consisted, first, of the ionisation in the chamber itself and also of ionisation in the other parts of the instrument. On the other hand, he agreed with the French that for the purpose of standardisation of apparatus they should adopt a constant source of ray of short wave-length.

PROF. CROWTHER suggested that for the purpose of standardisation they had all that was required, or could be hoped for at present, in the electrostatic unit. He hoped the unit would not be fixed in terms of radium, because the gamma rays of radium were so extraordinarily penetrating that it was impossible to shield the ionisation chamber from the gamma rays sufficiently.

This closed the discussion.

During the meeting of the Physics Section on Friday, July 3rd, the CHAIRMAN (Mr. C. E. S. Phillips), referring to the proposal to form an International Committee to deal with units and standardisation, said that the matter had since been given careful consideration, and a resolution would be placed before the Section, with the approval of Dr. Béclere and Dr. Finzi. In order to make the resolution quite clear, he mentioned that the British X-ray Unit Committee was formed in February, 1923, and had been doing a good deal of hard work. The members of the Committee were Sir William Bragg, F.R.S., Prof. A. W. Porter (Professor of Physics, University College, London), Prof. Sidney Russ (Physicist at the Middlesex Hospital) Dr. E. A. Owen (National Physical Laboratory), Mr. C. E. S. Phillips (Physicist to the Cancer Hospital), and Dr. F. L. Hopwood (Physicist at St. Bartholomew's Hospital).

The resolution was as follows:—

"That in order to give effect to the resolution passed at the joint meeting of the Physics and Radiological Sections on July 1st, the British X-Ray Unit Committee, formed in February, 1923, be requested to communicate directly with the physical and radiological societies of the principal countries throughout the world with a view to the nomination by those societies of representatives to constitute such an International Committee."

The resolution was passed, and subsequently came before the Radiological Section, and was also agreed to.

The Silvanus Thompson Memorial Lecture.

On Wednesday evening, July 1st, the eighth Silvanus Thompson Memorial Lecture was given by M. le Duc de Broglie, one of the most distinguished French physicists. The chair was taken by the President of the Congress, who explained that the lectures had been instituted by the Roentgen Society to perpetuate the memory of the late Prof. Silvanus P. Thompson, the founder and first president of the Society, which was the oldest Society in the world connected with the discovery of X-rays.

The subject of the lecture was "Absorption of X and γ Radiations and the Secondary Radiations which accompany them," and a reference was first made to the difficulty of finding explanations for the different effects of Roentgen and γ-rays. The electromagnetic theory of light, said the author, gave them a picture of wave forms as propagating electric and magnetic forces, and enabled them to understand something of the actions which might be expected when light fell on matter, but the process of these actions still remained very obscure. The interpretation of observed effects was rendered still more difficult by the fact that a given radiation could never be regarded as working alone, but was in almost all cases able to exist owing to the fluorescence of matter. For instance, when they used a beam of X-rays, they produced at the same time in the illuminated substance some softer rays giving a small amount of ultra-violet light and possibly some visible light. Although a great deal of work had been done in this connection, they were only just beginning to obtain and use reliable data for various rays of different hardnesses.

Reviewing some of the properties of X- and γ-rays, the lecturer sketched briefly the general ideas existing at the present time with regard to the electron theory, mentioning the beautiful work of Mr. C. T. R. Wilson, who discovered that the ionisation properties of Roentgen rays were not due to the rays themselves, but due to the secondary β-rays. In this way it had been shown generally that the electrical, physical, and biological effects of X-rays might be mainly due to the secondary electrons. Therefore, one of the first things to study was the direct action of the β-rays. As a matter of fact, recent work in France had shown that it was the β-rays which were responsible for the noxious action of X-rays on microbes and that some microbes were more susceptible to the action of these rays than others. The law of absorption of β-rays, however, was not yet fully understood, and it was a very complicated matter, although recent work had thrown considerable light upon it. They were completely ignorant of what occurred when an atom was absorbing radiation, but experiment had shown that this peculiar phenomenon was subject to the quantum law, and something of the same kind had been suggested in connection with Y-rays. The absorption of Y-rays closely resembled that of X-rays, but there were certain features which enabled an explanation to be given of the differences between the two.

After sketching briefly some of the features of the absorption process in the two cases, the lecturer said it was possible to conceive a trigger effect of radiation on living cells—in addition to the transfer of energy to matter by radiation. At the same time, the β-ray action made it difficult to account for low-frequency radiation, such as infra-red rays, and they could only confess their present ignorance concerning such deep problems. Nevertheless, they must not be discouraged, for the work that was being done was assisting them to make progress, and the joint efforts of bilologists and physicists would, sooner or later, enable a conception to be evolved out of the present obscurity.

The Silvanus Thompson medal was handed to the lecturer at the close, and he was warmly thanked by the President of the Congress and the President of the Roentgen Society, as well as by his audience.

Protection from X-rays.

An interesting discussion took place on July 2nd in the Physics Section on "Protective and Manipulative Methods in Relation to X-rays and Radium."

Dr. G. W. C. KAYE (National Physical Laboratory), who opened the discussion, recalled the unfortunate disasters which occurred to early X-ray workers and the endeavours made to secure protection for radiologists. As the result of the recommendations of the X-ray Protection Committee which was formed in 1921, the standard of protection had been considerably improved during recent years, and it was hoped that the long list of X-ray martyrs would be brought to an end. On February 1st, 1924, the Home Secretary issued an Order under the Workmen's Compensation Act, extending the scope of that Act to those who were injured in their occupation of administering and working with X-rays. Recommendations for the protection of X-ray workers had been drawn up in other countries. The National Physical Laboratory in this country had from the outset worked in conjunction with the X-ray Protection Committee, and the inspection of X-ray departments, from the point of view of conforming with the Committee's recommendations, had been added to the activities of the N.P.L. In the course of this work, naturally, some important points had been brought to light. For instance, with regard to

drawing up regulations, consideration had to be given to the fact that some operators were much more susceptible than others, whilst consideration also had to be given to the size of the department in question, the length of working hours, holidays and so on. Therefore, it was necessary to cater for the individual of least immunity in drafting regulations. Foolhardiness, also, could never be left wholly out of account. The X-ray worker did not always fully appreciate the magnitude of scattered radiation, which was many times the intensity of the primary beam. It was desirable to surround the tube with as much protective material as possible, but where that could not be done, the operator should be situated behind a screen or wall fitted with the necessary protection. The X-ray Protection Committee had laid down certain thicknesses of lead, according to the conditions, but it was essential to test the protective apparatus before use, against leakage. Quite unexpected things had happened through the lack of this precaution. The open bowl form of protection ought not to be used, and it was a pity that it was still being used in some cases, because tests had shown that it was possible to take a radiogram in any part of the room when this apparatus was employed. Again, there must be adequate ventilation of the room in which the operator was working, and generous ventilation was regarded as second only in importance to the actual protection itself, on account of the tendency for the generation of ozone and nitrous fumes. Further, the X-ray department should be in a place where there was plenty of sunshine and fresh air and not, as unfortunately was frequently the case in the early days, in the cellar. The floor area should be large, and any overhead wires should be corona-less, being run in tubes of adequate size. The minimum height for the ceilings of the rooms should be 11 ft. and the minimum height of any conductors 9 ft. Seven working hours per day were recommended by the Protection Committee, with four weeks' holiday a year and Sunday and two half-days per week off. The aim, said Dr. Kaye, should be to make the taking of an X-ray photograph as simple, easy, and innocuous as taking an ordinary photograph.

In the United States there had been three reports dealing with the subject of protection, and the Bureau of Standards had agreed to undertake the standardisation of protective material. Generally, the regulations were similar to those in this country. Much the same applied to Norway and Russia, and he wished to submit a proposal that the Congress should take steps to secure international agreement on the main question of protective measures for X-ray workers. Such a step would have obvious advantages when buying apparatus from abroad.

Dr. E. A. OWEN (National Physical Laboratory) gave some details of the measurements made at the N.P.L., of protective materials up to 200,000 volts. He added that probably scattering took place more at the higher voltages, but not a great deal of progress had yet been made in the study of this. With the new form of bulb which Messrs. Philips had brought out, described by Dr. Bouwers, it seemed to him that the protection problem would take quite a different aspect. At the present time very large protective boxes had to be used, with tackle to move them about, but in the case of the new Philips lamps the protection formed part of the bulb, practically speaking, which was ideal. The protection problem should be looked at on the lines of the development of this new tube.

Dr. H. P. PILON (Paris) urged the necessity for protection against both primary and secondary radiations, and expressed the view that the ordinary enclosure in boxes was unsatisfactory. A brief description was given of a new tube enclosed in a special type of lead-lined box, water or oil cooling being adopted. This tube was capable of working up to 200,000 volts, d.c., and it was claimed that the life of the tube was considerably lengthened in this way. The whole outfit was carried on a small runway and could be brought over the patient at any desired spot or angle, the rays being focused in a manner to prevent secondary radiations.

Dr. GLASSER (United States) raised the question whether the protection afforded by lead or lead glass was sufficient. Experiments which he had carried out had shown that rays sometimes came through this material.

Dr. FERROUX (Paris) said that protection from radium rays was well worth consideration.

Dr. V. E. PULLIN also emphasised the importance of ventilation in X-ray rooms. X-ray operators had complained of headaches and sickness, and he thought that this was due in some measure to the ionisation of the atmosphere. When forced ventilation was applied these symptoms disappeared. As to running tubes in oil, he had always experienced difficulty in doing this when using rectified a.c. The tubes referred to by Dr. Pilon were for running on d.c.

Dr. H. MOORE (London) said he always believed in getting as far away from the X-ray generator and tubes as possible; indeed, he had relied upon that more than upon lead screens.

Dr. KAYE, in a brief reply to the discussion, said his whole object was to unify standards of X-ray protection. He moved that the Congress be asked to take definite steps in this direction in conjunction with other countries. Dr. PULLEN seconded the proposal, which was adopted.

Determining the Capacity of X-ray Tubes.

In a paper by Dr. A. Frankel (Berlin), methods for determining the capacity of X-ray tubes were described, and a table was exhibited which enabled the user of X-ray tubes to determine the maximum current which a tube would carry.

Dr. A. BOUWERS (Holland) said that every tube maker would thank Dr. Frankel for the work he had done; a table such as he had devised would eliminate all guesswork.

Dr. MORRISON (London) also congratulated the author on devising something which would be of real practical use; it should result in tubes lasting much longer than they did at present. At the same time, the reliability of tubes to-day was remarkable; he knew of cases in which 30,000 radiograms had been taken with one tube, and the tube was still working. The Kodak people had provided means for arriving at the accurate exposure, and now the author presented them with a means for preventing damage to the tubes by overcharging. It looked as if X-ray photography would soon be as simple as ordinary snap-shotting.

(To be continued.)

Developing Community Activities.*

Advice to Municipal Electricity Suppliers.

By V. W. DALE.

ALL community activities, and also the public utility services owned and controlled by municipalities, depend for their creation and maintenance upon a favourably prepared public opinion. In spite of the World Convention last year which assisted considerably to establish advertising as a profession in this country, it still remains a task for the advertising world to overcome the barriers of civic dignity, legislative restriction and an entirely false economy which to-day compel the public to "walk in darkness" so far as many of our costly communal services are concerned. Advertising by municipalities affords a vast potential field for the advertising profession; this particularly applies to electricity supply. During the next few years the public service of electricity will by its own momentum inevitably progress; its influence, in industrial and domestic spheres particularly, will most certainly bring about a beneficent revolution in the lives of men and women. The supply of electricity is *not* so completely a monopoly as it is generally supposed to be because, although a municipality may have a monopoly in the supply of electricity, it is not really *electricity* that the people want, but light, heat, or power, which can be obtained also from other sources. The sooner and more generally that is properly recognised by those in authority the better for the industry.

* Abstract of a paper read before the British Advertising Convention, Harrogate.

Educational Advertising Necessary.

It is absolutely essential that a reasonable proportion of the revenue of the electricity supply undertakings should be devoted to educational advertising. Uninteresting official notices inserted in local papers and unreadable statements on circulars and accounts are not the methods to adopt to get the desired information into the mind of the average member of the public. At the same time it must be borne in mind that public utility advertising must essentially be of an informative character. Vision in these matters must extend beyond the boundaries of the Town Clerk's office; the assistance of the expert commercial artist and the expert copy writer must be enlisted to turn cold statements of fact and information into live "copy"—warm, attractive, bold, appealing and readily understandable. Unless every person of only average intelligence in any particular area is able to grasp the leading particulars of the facilities which his own public utility service offers him, then that body has failed to fulfil its duty to the public to whom it is supposed to be under legal obligation to serve. The need for such scientific advertising can be seen with regard to the price of electricity for lighting and heating. There are few if any undertakings in this country that do not offer a lower rate for heating than for lighting. Nevertheless, hundreds of people using electricity in Greater London, including journalists and people occupying public positions, are entirely unaware that they can get electricity in their houses at more than one price. This is because the municipalities merely announce, they do not advertise, and as a result the public is condemned to suffer the inconvenience of an incomplete and unsatisfactory service while the revenues of the undertakings are also adversely affected and good business is lost.

The Engineer as Salesman.

Another curious disability against which the commercial development of the electricity supply has been obliged to struggle for many years has actually been the absorbing nature of the engineering side of the work. During the early years management of the undertakings was very rightly placed in the hands of engineers men who by training and experience and outlook had nothing in common with anything so vulgar as "trade." Selling was regarded as unprofessional, and if a prospective consumer required a supply of electricity he was expected to almost beg for it; the industry rarely sought him. To-day, the position is rapidly changing. The efficiency and reliability of electrical plant, improved organisation, increased competition (and perhaps also the continuous evolution of man) finds the average central station engineer and manager keen to embrace all the arts of selling as a means of getting the best out of the public money invested in his undertaking. The business of supplying electricity is now established on a sound economic and scientific basis, and the commercial development of the undertakings is rapidly coming to engage the major portion of the suppliers' attention. At last it is even being realised by many of the municipal councils and committees that those vital and indispensable forces, demand-creating and selling, have got to be exploited very fully if their trading departments are to be developed.

The industry is awakening, but it has by no means visualised as yet all that is required of it. There are many undertakings serving communities of a million or more people, offering electricity at rates which reflect the application of the highest technical and engineering skill and generous financial policies, affording opportunities for vast and immediate developments, yet these undertakings very often have only a poor appreciation of the power of publicity. A thoroughly enlightened manager is still the servant of his masters, and often enough is powerless to move a lay committee when its interest in communal trading is no wider and no deeper than its desire to grasp every penny of profits towards relieving general district rates, a short-sighted policy as grossly unbusinesslike as it is unfair and inequitable to the consumer. The only one thing that will induce the people in authority to apply a portion of their revenue to educational propaganda work is for advertising men to show them that sound educational advertising can increase the yield of their undertakings many times over.

Wide Scope for Development.

The revenue of electricity supply undertakings in this country derived from the energy sold last year was of the order of £33,000,000, representing only about one-halfpenny per head of population per day. These figures confirm the wonderful scope for expansion. There is a tremendous field for development in the 10,000,000 to 11,000,000 houses in these islands even dealing with domestic applications only. Less than 12 per cent. of these houses are wired or using electricity at present for any purpose at all. Yet the public service of electricity is already available to 74 per cent. of the population. It is an absolute obligation devolving upon municipalities owning and controlling this important public service to utilise the Press, the hoardings, exhibitions, and other effective channels of publicity in order to educate and encourage the people to use this service upon which they have already raised and spent more than £300,000,000.

It must be remembered that the conditions obtaining in one supply undertaking sometimes vary widely from those obtaining in another; each separate case will demand careful study and investigation. Costly advertisements can only be effective when their appeal is supported by reasonable economic charges, the existence of adequate distribution systems, easy facilities for wiring, &c., and for some classes of apparatus hiring and hire-purchase schemes, maintenance of showrooms and a general disposition to take load-building seriously and provide an all-round public service. Electricity undertakings should spend on advertising and publicity not less than 2 per cent. of their revenue. Last year the revenue derived from electricity supply in this country was £33,000,000; this would have provided over £600,000 for advertising, but it is doubtful whether the industry spent £60,000.

There is also a vast field for co-operative effort by a corporate body engaging itself in fertilising the soil in preparation for the coming harvest—educating the public concerning the availability and use of various electrical appliances; enlightening the people by educational propaganda concerning the economics of production and fair prices; attacking ignorance, removing fear, suspicion and apprehension, which still hinder development to an extraordinary extent; and generally supplementing local and individual efforts.

Regarding the moral aspect of advertising two public and competing services, often owned and controlled by the same authority, particularly gas and electricity, keen competition and commercial rivalry between two or more producers or suppliers performing in some respects similar services is a state of affairs not only calculated to bring out the best, but is ultimately beneficial to the public. The Electrical Development Association has always held the view that it cannot be both judge and advocate; it prefers to be single-minded in its work, to push the use of electricity whenever it can and remain silent when it cannot, being content to leave the verdict to the people.

Tramway and Telephone Propaganda.

Tramway undertakings are able to advertise out of revenue, and they should set an example to the advertisers on their cars by employing only the best work in their own advertisements. The London County Council Tramways have done some excellent work in the way of Press advertisements, posters, leaflets, sport fixture cards, pocket maps, time-tables and other publicity.

There is a vast amount of work to be done in this country towards popularising the telephone. Great Britain actually stands fourteenth in its number of telephones per 100 of population. This state of affairs constitutes not only an appreciable handicap to the nation's trade and to national efficiency, but restricts individual comfort and convenience. In this country the telephone scarcely exists outside industrial and business life. To reach the density of telephone users compared with the population of Switzerland will require an additional 1,041,000 telephone stations at a capital cost of £52,000,000; to reach the Norwegian density will require an addition of 1,763,000 stations at a capital cost of £88,000,000; to reach the Danish density will require a capital outlay of £150,000,000 and the annual capital then required in the latter case to meet annual normal growth will be some £16 000,000, or double the present expenditure. The effect of these figures upon employment not only in actual telephone service but upon construction, maintenance, operation and administration, and also amongst many intermediate manufacturers of cable, lead, paper, cotton, timber, brass, iron, copper, rubber and silk, will readily be appreciated. Telephone development can only be accelerated by educating the public in the advantages of the telephone service. We shall probably see considerable activity in this direction in the near future; hardly any public utility gives advertising greater scope for ingenuity in its presentation.

The Glasgow Corporation Tramways.

Report for 1924-25.

WE have received from the general manager of the Glasgow Corporation Tramways (Mr. J. Dalrymple) a copy of his report for the year ended May 31st, 1925. This shows an increase in the revenue from £2,323,246 to £2,352,470. The working expenses increased to a greater extent *viz.*, from £1,691,171 to £1,746,000, reducing the gross surplus from £632,075 to £606,470. The addition of interest on investments made available £634,408. The charges against this were considerably heavier than those of the preceding year, amounting in all to £714,684 as compared with £585,366. The loss on the subway section rose from £3,544 to £18,710; the 'buses incurred a loss of £5,115; interest and sinking fund increased from £69,773 to £121,952; income tax from £40,481 to £75,931; and the contribution to the permanent-way renewal fund from £203,319 to £252 853. The net result was a deficit of £80,276, as compared with a profit of £49,199 in 1923-24. From a table showing the financial results from 1901 to date it is seen that this is only the second occasion on which a deficit has been incurred. In the previous case the adverse balance was carried forward and wiped out in the succeeding year.

The capital account shows an expenditure of £474,043 during the year, bringing the total up to £6,500,207. The year's expenditure includes £145,803 on the permanent way; £124,502 on the electrical equipment of the lines; and £48,554 on power-station and sub-station plant.

The traffic statistics record a car-mileage of 30,937,196, an increase of 1,292,698, while the number of passengers carried rose from 430,226,561 to 439,340,730. The consumption of electrical energy was 2,549,115 kWh higher at 51,324,436 kWh. The ratio of working expenses to traffic receipts rose from 72.94 to 74.36 per cent. The total length of route in operation at the close of the year was about 135 miles, an addition of about six miles since the last report. The number of cars was one less at 1,087.

A full analysis of the passengers carried and the revenue obtained from each fare is given in the report. From this it is seen that the penny fare is the most popular, 152,915,632 passengers, or 34.81 per cent., having travelled at this rate. The most revenue, however (30.72 per cent.), was brought in by 1½d. fares. Only 1.17 per cent. of the revenue was derived from fares over 3d. Another table shows the amounts paid in rates by the undertaking for each year since its inception; the figure for the past year shows a remarkable increase—from £40,481 to £75,931, but it is noted that this was due to a rise from £282,530 to £400,000 in the valuation of the undertaking, although the rate fell by 6d. in the pound.

A separate part of the report is devoted to the subway section which was acquired by the Corporation in August, 1923. There was a revenue of £99,269, but after the deduction of working expenses the surplus was only £769. To this was added interest, &c., making £3,192, but the deduction of capital charges resulted in a deficit of £18,710. The section carried 20,008,445 passengers and the car mileage was 1,266,713. The length of the track is 13.12 miles and 50 cars are operated.

The Electrical Imports of Argentina.

THE Argentine Government has recently issued detailed statistics of the country's foreign trade in 1923 and 1922. These permit of a much more comprehensive survey of Argentine imports of electrical goods than has hitherto been possible. The following table shows the values of the various descriptions of electrical materials imported, together with a note of increases or decreases. The values are the Argentine Customs Tariff valuations; the gold peso = about 4s.

	Gold Pesos. 1922.	Gold Pesos. 1923.	Inc. or dec.
Accessories for underground cables.—			
Total	13,000	42,000	+ 29,000
From Germany	5,000	14,000	+ 9,000
,, United Kingdom ...	—	6 000	+ 6,000
,, United States	4,000	19,000	+ 15,000
Electrical accessories.—			
Total	448,000	610,000	+ 162,000
From Germany	162 000	264,000	+ 102,000
,, United States	93,000	105,000	+ 12,000
,, United Kingdom ...	187,000	223,000	+ 36,000
Accumulators.—			
Total	153,000	111,000	− 42,000
From United States	18,000	36,000	+ 18,000
,, United Kingdom ...	130 000	68,000	− 62,000
Insulators of earthenware, faience, or porcelain.—			
Total	73,000	173,000	+ 100,000
From United Kingdom ...	29,000	27,000	− 2,000
,, Germany	31,000	139,000	+ 108,000
Glass insulators.—			
Total	5,000	3,000	− 2,000
From United States	5 000	2,000	− 3,000
,, France	—	1,000	+ 1,000
Wires and cables.—			
Total	2,101,000	3,844,000	+1,743,000
From Germany	958,000	1,686,000	+ 728,000
,, United Kingdom ...	515,000	1,122,000	+ 607,000
,, United States	297,000	571,000	+ 274,000
Ammeters and voltmeters.—			
Total	44,000	79,000	+ 35,000
From Germany	21,000	22,000	+ 1,000
,, United States	18,000	48,000	+ 30,000
,, United Kingdom ...	3,000	6,000	+ 3,000
Telephone apparatus.—			
Total	58,000	224,000	+ 166,000
From Germany	10,000	60,000	+ 50,000
,, United States	10,000	84,000	+ 74 000
,, United Kingdom ...	26,000	66,000	+ 40,000
Telephone material.—			
Total	182,000	714,000	+ 532,000
From Germany	11,000	73,000	+ 62,000
,, United States	126,000	404,000	+ 278,000
,, France	8,000	127,000	+ 119,000
Telegraph material.—			
Total	95,000	126,000	+ 31,000
From Germany	45,000	98,000	+ 53,000
,, United Kingdom ...	10,000	15 000	+ 5,000
,, United States	8,000	8,000	—
,, France	30,000	4,000	26,000
Clamps or porcelain tubes.—			
Total *	15,000	28,000	+ 13,000
Pushes and electric bells (returned by dozens).—			
Total *	6,000	5,000	− 1,000
Electric bells (returned by units).—			
Total *	15 000	20,000	+ 5,000
Carbons for arc lamps.—			
Total *	6,000	5,000	− 1,000
Electric meters.—			
Total	331,000	487,000	+ 156,000
From Germany	210,000	409 000	+ 199,000
,, France	55,000	1,000	− 54,000
,, United Kingdom ...	39,000	31,000	− 8,000
Small electric motors for fans, &c.—			
Total	31,000	86,000	+ 55,000
From Germany	19,000	48,000	+ 29,000
,, United States	7,000	22,000	+ 15,000
,, United Kingdom ...	5,000	10,000	+ 5,000
Electric batteries.—			
Total	182,000	238,000	+ 56,000
From Germany	17,000	21,000	+ 4,000
,, United States	139,000	183,000	+ 44,000
,, United Kingdom ...	21,000	22,000	+ 1,000
Materials for cells or storage batteries.—			
Total	82,000	177,000	+ 95,000
From Germany	27,000	38,000	+ 11,000
,, United States	34,000	58,000	+ 24,000
,, United Kingdom ...	21,000	29,000	+ 8,000
Porous jars for batteries.—			
Total	5,000	8 000	+ 3,000
From United Kingdom ...	3,000	6,000	+ 3,000
,, France	2,000	2,000	—
Glass jars for cells and storage batteries.—			
Total *	4,000	5,000	+ 1,000
Plugs.—			
Total *	20,000	26,000	+ 6,000
Wall sockets.—			
Total *	13,000	8,000	− 5,000
Circuit breaking devices, such as "wall fuse sockets."—			
Total	6,000	10,000	+ 4,000
From Germany	3,000	7,000	+ 4,000
,, United Kingdom ...	—	1,000	+ 1,000
,, United States	2,000	2,000	—
Insulating tubes.—			
Total	153,000	349,000	+ 196,000
From Germany	71 000	125,000	+ 54,000
,, United States	27,000	68,000	+ 41,000
,, United Kingdom ...	55,000	127,000	+ 72,000
Lampholders.—			
Total	88,000	140,000	+ 52,000
From Germany	81,000	105,000	+ 24,000
,, United States	3 000	23,000	+ 20,000
,, United Kingdom ...	1,000	6,000	+ 5,000
Switchboards.—			
Total	13,000	23,000	+ 10,000
From Germany	2,000	6,000	+ 4,000
,, United States	9,000	4,000	− 5,000
,, United Kingdom ...	2,000	12,000	+ 10,000
Switches.—			
Total	93,000	112,000	+ 19,000
From Germany	61,000	90,000	+ 29,000
,, United Kingdom ...	3,000	4,000	+ 1,000
,, United States	20,000	13,000	− 7,000
Electric fans.—			
Total	38,000	19,000	− 19,000
From Germany	6,000	5,000	− 1,000
,, United States	9,000	3,000	− 6,000
,, Italy	17,000	8,000	− 9,000
,, United Kingdom ...	4 000	2,000	− 2,000
Insulating tape.—			
Total	77,000	66,000	− 11,000
From Germany	20,000	18,000	− 2,000
,, United Kingdom ...	4,000	3,000	− 1,000
,, United States	50,000	42,000	− 8,000
Commutators (returned by weight).—			
Total	5,000	1,000	− 4,000
From Germany	2,000	—	− 2,000
,, United Kingdom ...	3,000	1,000	− 2,000
Commutators (returned by no.).—			
Total	10,000	11,000	+ 1,000
From United Kingdom ...	3,000	8,000	+ 5,000
,, Sweden	3,000	2,000	− 1,000
,, Belgium	4,000	—	− 4,000
Cut-outs, safety fuses, and current breakers.—			
Total	9,000	21,000	+ 12,000
From Germany	4,000	14,000	+ 10 000
,, United Kingdom ...	1,000	1,000	—
,, United States	3,000	5,000	+ 2,000
Electric bell indicators and telephone switchboards.—			
Total (all from Germany) ...	4,000	5,000	+ 1,000
Vulcanised fibre.—			
Total	20,000	23,000	+ 3,000
From Germany	—	2,000	+ 2,000
,, United Kingdom ...	3,000	4,000	+ 1,000
,, United States	16,000	12,000	− 4,000
Dynamos and motors.—			
Total	652,000	1,129,000	+ 477,000
From Germany	366,000	652,000	+ 286,000
,, United States	97,000	124,000	+ 27,000
,, Italy	66,000	125,000	+ 59,000
,, United Kingdom ...	77,000	87,000	+ 10,000
Incandescent lamps.—			
Total	546,000	1,434,000	+ 888,000
From Germany	236,000	642,000	+ 406,000
,, Holland	229,000	689,000	+ 460,000
,, United States	40,000	41,000	+ 1 000
,, United Kingdom ...	22,000	26,000	+ 4,000
Electrical material not elsewhere mentioned.—			
Total	317,000	559,000	+ 242,000
From Germany	119,000	220,000	+ 101,000
,, United States	116,000	197,000	+ 81,000
,, United Kingdom ...	54,000	97,000	+ 43,000

* Mainly from Germany

New Electrical Devices, Fittings, and Plant.

(Readers are invited to submit particulars of new or improved devices and apparatus.)

A New Foundation Construction for Transmission Poles.

The "Anchora" pole, a production of MESSRS. ARMSTRONG, ADDISON & Co., 17, North Bridge Street, Sunderland, has been designed with a view to simplicity in construction and rigidity in service. The feature of the pole lies in the construction of the foundation, fig. 1. Main baulks are provided on both sides of the legs and anchor baulks are secured to the ends of these at right angles. The main baulks are placed at the extreme ends of the pole butts and galvanised wrought iron ties are provided for transferring the upward pull on the legs to the foundation; these ties connect either the main or anchor baulks to the legs at a convenient distance above the main baulks and below ground level. Bent metal plates of channel section are provided for transferring the compression load

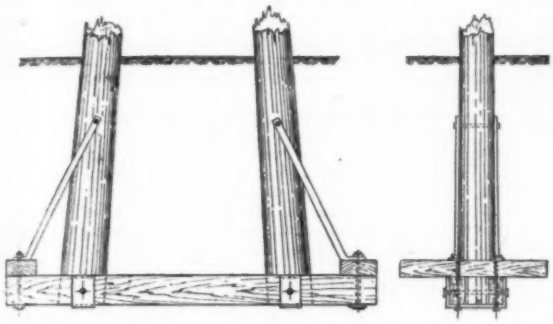


Fig. 1.—Showing Foundation Construction of the Anchora Pole.

on the legs to the foundation, passing over the top of the main baulks and underneath the pole butt. In excavating for the foundations, the hole should, where possible, be under-cut at each side to receive the anchor baulks connecting the lower ends of the legs after the latter have been placed into position, the solid undisturbed earth above the baulks offering increased resistance against overturning.

Both "A" and "H" poles are constructed on these foundations. An "A" pole, with the "Anchora" construction, under test is said to have been loaded up to 3½ tons at a point 31 ft. above the ground level.

A New Electric Ironer.

The accompanying illustration, fig. 2, is of the "Grand" electric ironer, a new product of the COFFIELD WASHER CO., Dayton, Ohio, U.S.A., which is being marketed in this country by MESSRS. L. G. HAWKINS & Co., LTD., 30-35, Drury Lane, Kingsway, London, and which was exhibited at the I.M.E.A. Convention at Brighton in June. The machine is light and

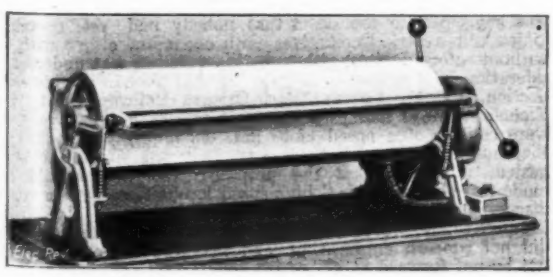


Fig. 2.—The "Grand" Electric Ironer.

portable, it weighs 76 lb., and its roller measures 26 in. in length. It is both operated and heated electrically, a small motor being provided for the operating. Both the motor and the heating elements are controlled by switches conveniently placed at one end of the base board, and mechanical control levers are provided at one end of the roller for its operation.

Electric Furnace Regulators.

For the control of electric arc furnaces employed for making calcium carbide, abrasives, alloys, &c., the GENERAL ELECTRIC CO., Schenectady, N.Y., has placed on the market, according to *Chemical and Metallurgical Engineering*, some new types of regulators for use with one-, two- and three-electrode equipments for which an auxiliary control panel is required. The advantage claimed is a decrease of the time interval between any change in current and the functioning of the equipment to overcome the change, in order to maintain a constant current. This is accomplished by the use of new punched frame contactors, inherently quick acting. The dynamic braking circuit is also completed in a shorter interval of time after the power is removed from the motor, thus decreasing to a minimum any over-travel of the electrode. Another advantage is the elimination of bearings or parts subject to wear.

A new voltage relay has been used to prevent the lowering of the electrode into the furnace in the case of supply failure or unbalanced conditions in the furnace. This relay permits a very low calibrating value, allowing the arc voltage to decrease to about 25 V before opening the control circuit to the lowering contactor.

A Mechanical Cable Union.

What should prove of value in the connecting of cables to "live" bus-bars or in making connections in places where it is dangerous to use molten metal, is a device which has been

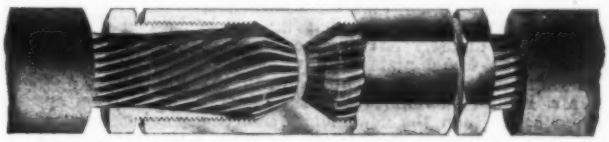


Fig. 3.—Section through the Mechanical Union.

designed by MR. C. TURNOCK, 41, High Street, Aston, Birmingham, in the form of a mechanical cable union which can be adapted for use with terminal lugs or couplings.

Fig. 3 is of a section through the union. It consists principally of two main parts, a gland A which is threaded into a trunk B, and each part is constructed with an internal bevel edge. A split ring which is placed under the outer layer of conductors creates a bulge on the cable core which is gripped between the gland and the trunk at the bevel edges. Both the gland and the trunk are hexagon shaped, so that the union can be tightened up by means of a couple of spanners. This device is very strongly constructed and the joint can be made very speedily. The maker claims that contact is made at four points, the butt end, the end circumference, and each side of the cone or bulge on the cable core.

In the case of the cable lug the union trunk forms a projection of the lug as in an ordinary sweated terminal, and in the case of the coupling a double union is used, one at each end of the trunk.

A New Lamp Fitting.

The accompanying illustration, fig. 4, is of a new design of lamp fitting, the "Wigan" prismatic, recently put on the market by HEYES & Co., LTD., Water-Heyes Electrical Works, Wigan. It carries a prismatic glass moulding, by which the light is said to have a reflected area of 180 deg. from the plane of the fitting. It occupies about the same space as the standard type of bulkhead fitting, and the makers claim that it

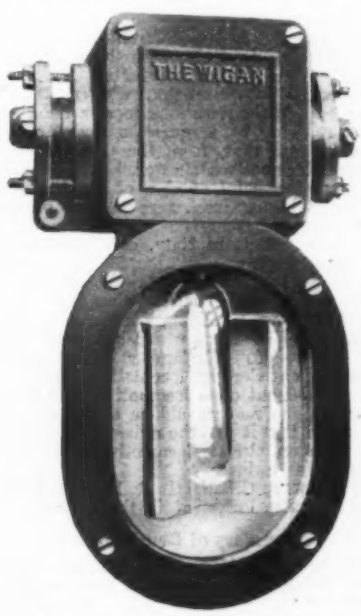


Fig. 4.—The "Wigan Prismatic Lamp Fitting.

gives a normal front with an increased side illumination, and is suitable for use in place of the standard bulkhead fitting. It can be supplied with or without the joint box attached.

The International Railway Congress.

A Review of some of the Electrical Features.

(Concluded from page 72.)

High-Speed Electric Locomotives: *Discussion (continued).*

The next point discussed was to what figure had the maintenance of d.c. and a.c. motors been reduced, and what mileage had been found possible without examination requiring more than one day.

Mr. BIANCHI said that in Italy there were machines which had been in service 15 or 20 years, and had not required repair so far as the electrical part was concerned. The only repairs necessary were to the frame of the engine.

Mr. WALLIS said that in the United States they believed that the cost of a.c. single-phase motors, as compared with d.c. motors, was slightly greater, but that experience was based on cars rather than on locomotives.

Mr. STEINER considered that the single-phase a.c. motor was often unjustly criticised, and that it would not cost much more to maintain than would the d.c. motor. Very varying results had been obtained with commutators.

Mr. PARODI maintained that the motors built 20 years ago were better than the new motors from the point of view of construction, though the new motors were better designed.

Mr. BIANCHI said he had some d.c. motors which had been in service for 25 years, and were still running well; he considered them the best motors he had, and agreed that modern motors were not so satisfactory. The latter were smaller and more heavily loaded, using forced ventilation, and consequently were more liable to cause trouble, particularly if the fan failed.

Mr. WALLIS said there was a disposition in America to sell a smaller motor for a given h.p. than was the case 10 years ago.

The remainder of the discussion was devoted to a comparison of the mean distance run by electric and steam locomotives of the same class, and the steps being taken for operating electric locomotives by a single man.

Mr. WALLIS said that steam locomotives in America were running as much as 500 miles on one trip. There was no experience as to how electric locomotives would compare with them under such circumstances, but they were expected to cover at least 30 per cent. more mileage in a month than the steam locomotives on normal service.

Mr. WEISS said that on the Simplon line in Switzerland they were able to get 15,000 km. (9,400 miles) monthly out of each electric locomotive, whereas the mileage when the line was steam operated was from 10,000 to 12,000 km. per month (from 6,000 to 7,500 miles).

Mr. WALLIS said he was informed that on the New York, New Haven, and Hartford Railroad the average mileage with all the electric locomotives was 200 per day, and they had obtained 500 miles a day with a single locomotive.

Mr. WEISS referred to a Swiss line on which both steam and electric locomotives were used, the latter being of the 3-phase type, but the high-speed trains were drawn by the electric locomotives.

Mr. BIANCHI pointed to the different results obtained with different locomotives. In Italy, with the 3-phase locomotives, the time during which they were stopped for repairs was between 25 and 50 days annually, whereas the d.c. motors ran for two years without serious repairs being necessary.

Mr. WEISS, replying to a question by Mr. C. Renevey (Alsace-Lorraine) said that, from the point of view of heavy repairs, electric locomotives showed better results than the steam, but, from the point of view of small running-shed repairs, the steam locomotives were better, probably due to the fact that electric locomotives were still new.

Mr. BIANCHI said that, in Italy, cars were driven by one man only, the "dead man's" handle being used. It was hoped to apply to high-speed electric locomotives shortly an arrangement which would enable the driver to leave the handle for a period not exceeding a minute, or half a minute, after which period the current would automatically be cut off.

Mr. L. M. BARNET-LYON (Holland) said that, although it was easy to control an electric locomotive, there were other duties to be carried out on a locomotive, and it was open to question whether one man would be sufficient.

Mr. WALLIS said that it was the universal practice in America to have two men on electric locomotives, but one man only on multiple-unit car trains.

Mr. H. N. GRESLEY, C.B.E. (L. & N.E. Railway) said that that practice was also universal in this country.

Summary of Conclusions.

On Monday morning (June 29th) the conclusions arrived at as the result of Friday's discussion were considered by the meeting, and summaries of the views expressed on the nine questions submitted for discussion were adopted by the meeting.

On the first question the summary put forward for consideration stated that the tram and gearless types of drive could be used on high-speed locomotives, and give good running. It was, however, necessary, taking into account the weight not spring-borne and the relatively low centre of gravity, to reduce as far as possible the weight per axle. Mr. M. JAPIOT (Paris, Lyons and Mediterranean Railway) considered it would be dangerous to put in a clause saying that it was desirable to reduce the weight per axle. No evidence had been given showing that this was really necessary. If the summary were adopted in the form suggested, permanent-way men might make a stand against it, and might wish to limit the axle weight to about 12 tons per axle, but if the weight were 15 or 20 tons, he would be content. Finally the resolution was passed in the following form:—

1. "The tram and gearless types of transmission can be used on high-speed locomotives, and give good running. It has been found advisable, when taking into account the weight not spring-borne and the relatively low centre of gravity, to limit the weight per axle to reasonable limits."

Resolutions relating to the remaining questions were adopted as follows:—

2. "The quill drive can be, and is used on high-speed locomotives. The quill and driving shaft should be kept as far as practicable concentric, and the condition of the track should be good. The difficulty of maintaining concentricity increases with the number of axles on one frame."

3. "It would be as well, in the case of high-speed locomotives driven by rods, to incorporate shock absorbers in the transmission. The fitting of the rods should be carefully maintained in all cases."

4. "Different types of transmission, with oil or grease lubrication, are actually in use on high-speed locomotives, and generally give satisfactory results."

5. "There is insufficient experience so far to enable recommendations to be made as between the rod and the direct drive for high-speed locomotives, both types being actually in use. Bissel trucks or bogies only appear to be required on locomotives running at very high speeds."

6. "The use of oil switches and transformers is general on high-speed locomotives working on a.c., and do not appear so far to have given risen to any particular trouble."

7. "The electro-pneumatic control appears to be the one that should give the best results on electric locomotives."

8. "Electric traction by high-speed locomotives has not been in use long enough to enable any judgment to be arrived at as to the difference in cost of upkeep of the various types of motors, but it appears that it will be small."

9. "The working is arranged so differently on the principal railways so far as the use of high-speed steam and electric locomotives is concerned, that it is not possible to come to any definite conclusions as to the relative mileage these engines can run between heavy repairs. Up to date, both experience and calculation indicate that the electric locomotive will give a better mileage than the steam locomotive."

With regard to the question of the steps that had been taken to operate electric locomotives by one man, a summary was suggested to the effect that nobody had yet operated high-speed electric locomotives with one man, either with or without safety devices, although this question was under consideration in different countries. It was stated, in this connection, by M. Lacoin (Paris-Orleans Railway) that two French railways had passenger and freight locomotives that were capable of a speed of 90 km. (56 miles) per hour, and they intended to work them with only one man. He suggested, therefore, that the proposed resolution should be made to refer to "very" high-speed locomotives. After some discussion, however, it was suggested by Mr. J. T. Wallis (Pennsylvania Railroad) that this was a labour question, and did not concern engineering, and that the summary should not be put forward at all, which course was agreed to.

Miscellaneous Proceedings.

During the second week of the Congress the questions under discussion by the various Sections in connection with a number of aspects of railway administration were disposed of, and more time was devoted to visiting railway works in various parts of the country. Among the questions discussed by Section V (Light Railways and Colonial Railways) was that of "Traction for Light Railways." This turned largely upon the merits of traction by steam and by internal-combustion engines and there was little discussion with regard to electricity. The adoption of electric traction depended essentially on financial considerations; in proportion as initial expenditure and working expenses diminished, it would be possible to develop the use of this system.

In connection with a discussion on the breaking of rails by Section I (Ways and Works), a report was presented from Japan describing an apparatus called "The Magnetic Rail Defectoscope," for examining from the outside, without spoiling the rail, internal defects such as local segregations of impurities, &c. The principle of this apparatus is as follows: When a ferromagnetic substance, such as iron or steel, is placed in the magnetic field, it is at once magnetised by magnetic induction. When the magnetic permeability is invariable

over the whole length of rail, the magnetism induced by a constant magnetising force is invariable, but if the permeability varies owing to some fault existing in the rail, the variation in the induced magnetism in that part causes a leakage of magnetic flux, the amount of which can be shown by testing with an exploring coil. The measurement is carried out by placing a horse-shoe magnet on the rail head and sliding it along from one end to the other. An exploring coil is fitted on the surface of the rail between the two poles, and slides with the magnet so as to cut the leakage flux. The reading of the galvanometer is taken on a recorder.

According to the programme of the Congress, the closing ceremony should have taken place on Thursday morning, July 9th, but, no doubt in order to allow the delegates more time to get to Darlington for the railway centenary celebrations this ceremony took place on Wednesday. It was preceded by a general meeting, at which the question of the re-admission of ex-enemy countries and Russia to the Congress was discussed. A request for re-admission had been received from Russia, but it was decided that the situation in Russia, particularly from the railway standpoint, was not sufficiently stabilised to justify re-admission to the Association of the railway administrations of that country. With regard to Germany, whilst no formal request for re-admission had been made, semi-official negotiations had been in progress. There was some discussion on this point, but finally, the voting of the delegates was in favour of the re-admission of Germany, on the same terms as other nations.

Correspondence.

Correspondents should forward their communications **at the earliest possible moment.** *No letter can be published unless we have the writer's name and address in our possession.*

Installation Policy.

I have been deeply interested in reading the paper given by Mr. L. L. Robinson before the I.M.E.A. at the Brighton Convention; as the author's ideas and statements are such a mixed conglomeration, in fact a real "Irish stew," it is difficult to pick out the solid food and know what his policy really is.

On reading through his paper and taking things in general one gathers that there is no one capable of satisfactorily dealing with installation work but a municipal electric supply department with a highly paid chief at its head, a highly paid staff of experts (whatever this may mean), another staff of supervisors, and a large staff of competent workmen; and yet, although in Mr. Robinson's opinion the above is the right and proper way, he looks forward to the day when anyone can go to a "Robinson Woolworth & Co." bazaar and buy a complete wiring installation over the counter and erect it himself.

If the latter is what Mr. Robinson really does want, I would suggest that he leave his present padded armchair provided by the public, give up his handsome salary paid partly by electrical contractor ratepayers, start a Robinson Bazaar for the sale of house lighting sets in cardboard boxes and get the schoolboys of Hackney and district busy in electrifying the district; and we shall very soon have a second edition of the Great Fire of London. When this time arrives, I sincerely hope the Robinsonian Electrical Bazaar will be in the midst of it, but that the author and perpetrator of such a scheme will be spared to see the folly of his ways.

Now to more detail: although Mr. Robinson explains at the outset that he does not damn the electrical contractor, I consider his paper is a general condemnation of the contracting industry at the present time. He did not propose to deal with wiring and installation work, and yet he dived into wiring and installation work to the point of lowering it to the 6d. bazaar level.

I would like to ask Mr. Robinson if he considers that the gas and waterworks departments of our Corporations should also carry out the whole of the installations of gas, lighting, heating, power and water distribution in the whole of the premises where these services are needed and used, as this would be on a par with part of his gospel.

If the objective of municipal electrical suppliers to give a perfect service, &c., without a loss, then Mr. Robinson has all his work cut out to do this consistent with the service being as cheap as it should be. What is wanted of Mr. Robinson and all suppliers is a cheap supply of electricity, and the contractors will see that the installations to use a cheap supply are put in at a reasonable rate, consistent with good-class workmanship, reliability, and satisfaction.

Mr. Robinson goes on to state that the primary object of a wiring contractor is to make a profit. This, Mr. Robinson, as far as the better-class contractor is concerned, is not the truth. Profit is only one part of his object, the other parts being a reliable and efficient installation, carried out with materials and apparatus suitable for the work it has to perform, thereby ensuring continuity of service, which the customer expects and is entitled to, and a satisfied client who will come again or recommend his friends. The profit portion is the last item, and if the contractor gets any after completing the job as above, he is rightly and justly entitled to it.

According to Mr. Robinson's statement, a wiring contractor will sell anything that carries a big profit, whether the best service is given to the consumer or not. This is one of the foulest libels ever levelled against the contractors, who have in their ranks a number of the ablest men in the industry to-day, and who are also honest.

If Mr. Robinson has the interests of the electrical industry at heart, I ask him, as a gentleman, to withdraw the innuendoes made in this clause of his paper.

Is it not sound policy to give a consumer an installation that is best suited to his requirements, consistent with safety and satisfaction in use, and at a reasonable cost to the user?

Requirements vary, and no one knows better than the contractor how much, and no one gives more time and thought to these matters than the contractor.

Mr. Robinson appears to be at daggers drawn with the contracting industry, whereas he should realise that the contractor is the best friend of the supply engineer, the unpaid canvasser of every undertaking, who instead of being kicked and blackballed should have his friendship and well-being cultivated.

Thank goodness we are still blessed with a majority of sensible and reasonable-minded central-station engineers, who appreciate the value of reliable contractors in their midst.

Instead of setting-up huge wiring departments with staffs of unproductive officials, as suggested by Mr. Robinson, far more good would be done by making more use of, and encouraging, the contractor, even if the supply authority went to the extent of subsidising him to the extent of one shilling per 60-watt lamp, and 10s. per kW of other plant that the contractor canvasses and works for and gets connected to the mains. After all, who benefits the most? Why, the central-station engineer, who has a customer for always once he is connected, whereas the contractor very rarely gets any more revenue from him except for a few lamps or a pair of brushes and a heating element occasionally.

A policy of close co-operation between the supply authority and the contractor is the best policy Mr. Robinson can adopt if he is desirous of extending the number of installations on his mains; above all let him cultivate co-operation with registered contractors, and not the "curbstoners" he raves so much about, the "here to-day and gone to-morrow" crowd.

Many interests have been striving during the last few years to develop a close co-operation between all sections of the electrical industry, which is all to the good, but Mr. Robinson's paper is a direct slur on all those excellent gentlemen who have given much time and thought to the furtherance of co-operation in the electrical industry.

Harry Moss, A.M.I.E.E.,
National Registered Electrical Contractor.

Bradford, *July 6th*, 1925.

I have read Mr. Robinson's paper in the ELECTRICAL REVIEW and his reply to criticisms.

He states that he is now working through contractors on the basis of schedule prices and specifications which have been drawn up in co-operation between contractors and himself.

As far as I know there are only two registered contractors within his area, one of which is the firm of which I am the principal. My own firm has not been approached regarding work for the Hackney Borough Council, neither have we done any contracting work for it since war time, when we were all short-handed. It appears to me, therefore, that the work he talks about as having been arranged and placed with contractors has all gone to one man, and as I have been a ratepayer within his borough for years, it is scarcely a fair way of dealing with such work.

Only about twelve months ago his staff took an order from a firm for whom we had worked for years. To get this order they must have undercut, as I quoted at estimated net cost, knowing that I was in competition with them. Is it to be wondered at that contractors hit back when such things occur?

Mr. Donald Munro's letter in last week's issue of the ELECTRICAL REVIEW expresses the opinion of the majority of electrical contractors. It points out plainly that such men as Mr. Robinson would not be in existence had not electrical contractors carried out the spade work, and prepared the way for them.

It is only of recent times that Mr. Robinson has seen fit to express views concerning contractors as he did at the convention of the I.M.E.A., and for what reason it is difficult to conceive. In this world I take it that no two people have exactly the same views on any subject, but two people having identical interests have no need to run down each other simply because they do not agree on certain fundamental questions concerning the methods of running their respective businesses, and I may remind him that neither party can work amicably with the other unless both make up their minds to agree to differ.

Unfortunately I am one of the small-minded contractors in the eastern area of London, who apparently are not the sort of men that ordinary engineers could associate with. This may be so, but I have dozens of electrical and mechanical friends who, I am certain, would go out of their way to help me, if I needed help, and I cannot suppose that they are all small-minded persons as well as myself.

The whole question of municipal trading appears to be one of money. Mr. Robinson's policy is to keep up the price of the unit and give free service, at the same time charging for laying services, which after all belong to the borough. Do other municipal engineers also agree with this, and is it policy to charge high prices for the commodity they have to sell, and cut the prices of installations? Surely their whole energy

should be devoted to making the price of current such that it would compete with all other classes of fuel and light, and then electrical energy would sell itself. They could well leave installation work to people who have devoted their lives to the subject, and like Ford cars, electricity would become universal.

Mr. Robinson states that contractors are out to make profits. Of course they are, otherwise they could not live, but is not his whole time spent in conceiving ways and means of making profits? He gives away on one hand to show a profit on the other, so where lies the difference between him, and the contractors of whom he speaks?

As far as my own firm is concerned, two or three years ago we stocked practically everything electrical. We were the first people here to stock, demonstrate, and sell electric washing machines, electric sewing machines and so on, and given fair play we should now have been doing good business in this direction. At that period the Hackney Borough Showrooms were equipped with a few motors and possibly a cooker, but very little besides, and just as we were beginning to make headway, an exhibition was organised by the Corporation at the Hackney Baths, but NO ELECTRICAL CONTRACTOR WAS ALLOWED A STAND. The Hackney Borough, of course, was there, but contractors had to content themselves with being spectators. Since that time our sales have gone down 100 per cent., and we have lost at least two or three good orders through the Council engineers. As I know my business thoroughly, it makes me very sore to think that on one hand the Council takes my rates, and on the other, takes away my means of paying them through absolutely no fault of my own.

H. Linzell, A.M.I.E.E.

London, *July 10th*, 1925.

Artificial Crop Drying.

I am afraid that personal differences can hardly be of interest to your readers, hence I do not think it worth while replying at length to Captain Owen's letter in your last issue. His communication confuses several technical points. I agree with him that when hay is made artificially by a process which is an incomplete copy of mine, results are not good, as was proved at a very considerable expenditure of money by the full-size tests made recently by the Ministry of Agriculture.

Chemical analysis and tests by feeding to cattle have demonstrated that my process gives superior results to average weathered hay. This the Ministry has not had an opportunity of sampling, as even the test it ran on my farm was of a modified method.

My process covers both hot- and cold-air methods; this takes away a lot of the point of the letter.

I am pleased to say that at last I have received an indication that the Ministry is—somewhat tardily—going to recognise what others and myself have done in bringing to the fore this new development.

The Ministry and the Oxford Institute of Agricultural Engineering have done a great deal of most valuable laboratory research work in this subject. This has cleared up many empirical matters, and due credit should be given to Captain Owen for his share in this, also for the development of an excellent oil-fired pre-heater. This, however, does not alter the fact that if they had been willing to give due recognition to the pioneers, the country would have been saved some thousands of pounds which have been expended in useless experimental work. However, we all know the little ways of a Government Department.

R. Borlase Matthews.

East Grinstead, *July 11th*, 1925.

I regret that Mr. Borlase Matthews apparently finds several unpalatable truths in my recent article on the above subject. This hardly justifies the serious mis-statements which he makes on the hot-air system, which certainly has proved itself in practice, as your correspondent must know.

I worked the cold process for three seasons, on Mr. Matthews's own 600-acre farm and elsewhere, and I am therefore well acquainted with its practical difficulties and the unreliability of the product, but I have never yet seen a hay rick, good or bad, made by it which exceeded 17 tons finished weight. Surely it is better to succeed (as the hot-air process does) with real 10-ton stacks made on sound lines than to fail with mythical 25-ton ricks made on an unscientific and rule-of-thumb basis.

Your correspondent refers to clover or "seed" hay as a crop which possibly justifies the use of preheated air. He might have stated at once that he has never succeeded, nor have I, in making even passable seed hay by his cold-air process. In Scotland there have been repeated failures, and last year Dr. Hendrick, of Aberdeen, published a report describing these negative results, in which he condemned the system, root and branch.

I cannot imagine anyone who has really understood the nature of the problem presented by artificial crop drying ever rejecting the pre-heating idea, especially on theoretical grounds. It would be very interesting to have some definite reasons given for the alleged superiority of cold air. Your correspondent, I now understand, originally tried the hot-air system, and it is to be regretted that he did not succeed with it for crop drying.

I am sorry that I am unable to follow your correspondent's meaning when he states: "Equally good hay could be produced by either method, provided the methods adopted for the cold-air system are adopted in conjunction with the hot-air way." Perhaps it refers to the elimination of structures inside the rick and to the use of a plurality of cavities, spaced to give approximately equal air resistance, whereby larger ricks are possible at least for cereals. This arrangement, suggested and developed by myself, is covered by Mr. Borlase Matthews's patent, but I am not sure that it would work very well with the higher air pressures used with the hot-blast process.

I do not admit that an error crept into my article regarding the preference which cattle show for hay made by pre-heated air. It is true, however, that no direct comparison has yet been made, perhaps because of the difficulty in getting cold-blast hay in sufficient quantity to run a proper test. His remarks, therefore, that the cheaper method, without pre-heating, should produce a slightly better hay, refer to a condition of things which hitherto has not obtained in practice. In any case, to call the "cold-blast" process "cheaper" is hardly justified so long as it works on an intermittent basis. The cost of inspecting thermometers and blowing for a short time daily must ultimately be greater than the one long blow which gives results. If your correspondent will study the experiments which have been made, particularly in America, by nutrition experts, he will realise that his "hay," even at the best, can never equal in feeding value that made without fermentation and the action of sun and rain. This is seen in the analyses given in my article. Hot-blast hay gave 2.1 per cent. nitrogen, while good sun-made hay showed 1.9 per cent.; fermented hay—the cold-blast process is based on the control of this supposed necessary process—had only 1.7 per cent., while the worst hay, weathered on the field, gave 1.5 per cent.

Mr. Matthews implies that his patent covers pre-heating, though I doubt if he is first in the field, for it is certainly an old idea, going back about 50 years. So far as I can see, any practical form of heating equipment used to-day for the purpose would infringe one or other of the many detail patents controlled by the Crop Drying Company. Your readers, therefore, need not fear that in buying equipment, made under that company's licence (and there is no other on the market at present in a practical form), they will be infringing your correspondent's patent.

H. A. Carney.

Lingfield, Surrey, *June 28th*, 1925.

Radio Trade Discounts.

I notice from an announcement which appeared in *The Radio Trade Journal* of July 4th that the N.A.R.M.A.T. has tardily recognised that the existing discount which its manufacturing members are allowed to offer is insufficient. The Wireless Retailers' Association has always contended that the terms are altogether inadequate and should be increased to the amount allowed in kindred trades, namely, 33⅓ per cent. Short of this figure reasonable profits cannot be made, since considerable deductions for overhead charges and service have to be allowed for by the dealer.

The small increases now promised will be welcomed as a move in the right direction, but the method of initiating them will be strongly deprecated by the great mass of dealers. In order to be eligible for these increases dealers must either be or become members of the N.A.R.M.A.T., which implies that they must among other things bind themselves not to deal in oversea apparatus.

Very rightly the average dealer feels that he is entitled to be and to remain a free agent. He holds the conviction that he should be untrammelled by arbitrary conditions imposed by manufacturers, and strongly objects to interference with his liberty of action. Even more resolutely is his face set against anything which may appear to tend in the direction of monopoly.

In making these remarks I speak as one who has had an exceptional opportunity of gauging the opinions of the retail trade.

The Executive of the N.A.R.M.A.T. appear to have overlooked the fact that the weapon they are employing is a double-edged one, and also that preferential treatment need not necessarily be confined only to one quarter; and I commend these considerations to their serious attention.

There are large numbers of manufacturers of apparatus of the highest class not associated with that body who are in entire sympathy with the W.R.A., and the demand for oversea apparatus is growing apace.

I am, however, disposed to believe that the consequences of this movement will be such that the N.A.R.M.A.T. will have no alternative to extending these increased discounts to dealers generally; but in the meantime they are alienating large numbers of retailers, and this at a moment when the crying need of the industry is for goodwill, harmony and co-operation.

Fredk. S. Horsey,
Chairman of The Wireless Retailers' Association.

London *July 10th*, 1925.

The Dimensions of Commutators.

A friend who happened to be using the formulæ in my article relating to the dimensions of commutators, published in your issue of March 13th, 1925, has kindly pointed out to me that on page 405 the symbol L/λ has been wrongly printed as $L\lambda$ in two places: once in equation (5) in the right hand column, and again at the beginning of the fifth line from the foot of the same column. I would ask you to publish this note for the benefit of any readers who may be interested in the matter, so that they may insert a stroke between L and λ

in both places. I am sorry that these errors should have occurred in important equations, presumably through incomplete alertness on my part in reading the proofs.

Thomas Carter.

Newcastle-on-Tyne, *July 10th*, 1925.

Celluloid in Accumulators.

In common with your correspondents on the subject of the ignition of celluloid cases, I appreciate the timely letter from "Surveyor" of May 11th, followed by the valuable recorded experiments in your issue of June 12th by Colonel G. H. Page and Mr. C. E. Hume; further corroboration of the danger from fire was also given by "M.I.E.E., &c.," on June 26th.

The danger due to the ignition of celluloid cases I now avoid by employing cells fitted in glass containers, which have the further advantage of the absence of acid frothing, with the usual deterioration of the insulation.

Apparently it is not generally known to your readers that the A. F. A. Accumulator Co., Ltd., having realised the danger of fire due to employing celluloid cases, have for several years past specialised in manufacturing cells fitted in toughened glass grooved containers, which are supplied from one-ampere-hour size. Obviously, if the A. F. A. type of cell in glass containers were generally employed, the present danger of fire would be eliminated.

Chas. Lack.

Thornton Heath, *July 7th*, 1925.

Special a.c. to d.c. Rectifiers.

I shall be obliged if you or any reader can put me on to one or two makers capable of turning out a fair number of small rectifiers as per short specification given below:—Small capacity alternating-current rectifiers of full-wave type, to deliver rectified, or direct, current from a.c. mains of the usual service voltage, 220-230 V. The rectified current to be at a voltage as near as practicable to the original a.c. supply of 220-230 V, and the current in the neighbourhood of 0.1 (one-tenth) of an ampere. The rectifier to be in as simple and compact a form as possible, without moving parts, noiseless, and free from liquid, unless hermetically sealed, preferably of a type not requiring frequent renewals, such as tubes, globes, &c. The rectifier to be capable for functioning for periods of 6-8 hours continuously, and to require an absolute minimum of attention. Price being a consideration, the suggested preferences depend on the cost involved.

Rectifier.

July 8th, 1925.

A British Institute of Radio Engineers.

May I be allowed to occupy your space for a few lines, to reply to Mr. Nelson's letter in this week's issue of the ELECTRICAL REVIEW?

Mr. Nelson says, "... surely if the Americans can run a successful Institute of Radio Engineers as well as the American Institute of Electrical Engineers, we Britishers can do the same." I would like to point out that the American Institute of Electrical Engineers has no Section devoted especially to wireless matters, and in fact, on looking through the pages of the *Journal* of the A.I.E.E., one finds that wireless subjects are very sparingly dealt with. In other words, the A.I.E.E. does not pretend to cater for wireless engineers to anything like the same extent as the Wireless Section of the I.E.E., and it is not surprising, therefore, that a separate Society exists in America for the reading of papers, &c., on wireless matters. In this country, on the other hand, we have a technical body which started its existence as the Society of Telegraph Engineers and Electricians, and to start a new Society of Telegraph Engineers, which is what Mr. Nelson's proposal amounts to, seems to me a very undesirable step.

I still maintain that the qualifications necessary for membership of the I.E.E. are necessary to a wireless engineer, and to brand an engineer as a wireless engineer by giving him some letters to put after his name is a very dangerous practice unless there is at the same time some guarantee that the engineer has had a thorough electrical training.

I would suggest to Mr. Nelson that there are quite a number of people in this country who are members of the American Institute of Radio Engineers but who are not in any way professionally engaged in wireless engineering: who are, in fact, amateurs. The I.E.E. is not open to amateurs, however skilled they may be, and consequently they applied for and gained membership of the I.R.E. My only comment on this is to repeat that amateurs should join an Amateur Society and not strive after professional honours unless they desire to become professionally engaged—in this case, in wireless engineering. It is for this reason that the Radio Society of Great Britain has resolutely refrained from encouraging its members to call themselves M.R.S.G.B.

I am quite ready to admit that the constitution of the Wireless Section of the I.E.E. might be revised so as to meet the requirements of Mr. Nelson's friends in some way, but I most emphatically maintain that there is not room for *both* the present Wireless Section of the I.E.E. and the proposed new Society.

I am confident that this matter can be left in the hands of the Committee of the Wireless Section of the I.E.E., for, after all, if this new body comes into being it is *their* funeral, not mine.

J. F. Stanley, B.Sc., A.C.G.I.

London, *July 13th*, 1925.

Legal.

Theft of Electricity.

ABEDNEGO JONES, described as a repairer, was fined 40s. at the Ebbw Vale Police Court on July 9th for the theft of electricity, the property of the Council. It was stated that an inspector discovered that the cable leading in to the defendant's premises had been pierced with a hatpin in such a way as to divert current from the meter.

A similar fine was imposed on Evan Evans, a fitter, on the same day for a like offence. In this case, although the meter had been disconnected, it was found that the defendant was still using electricity for lighting.

Claim for Injury through Electric Shock.

AT the Mayor's and City of London Court on July 6th, Ronald Evans, aged 20, of Lewisham, sought to recover compensation from H. W. Daniel, electrical engineer, Fetter Lane, E.C., under the Workmen's Compensation Act. For the applicant it was stated that he was cleaning electric light fittings at Smithfield Market in March, 1923, when he received a severe shock which made him jump a distance of nine feet and he was impaled upon a meat hook. The market was closed at the time but his cries attracted the attention of the police, who conveyed him to St. Bartholomew's Hospital. He remained in a convalescent home until June and then re-started work in August. Owing to nervous trouble he had to give up a fortnight later. Some time after applicant was examined and was found to have contracted phthisis, and medical witnesses attributed this to the effect of the accident upon the applicant's system. Another medical witness, who appeared for the respondent, said that the fact that the applicant had resumed work and had subsequently broken down led him to think that the accident was not the causative factor.

Judge SHEWELL COOPER, in making an award in favour of the applicant, said that the fact that he had never regained his normal health after leaving hospital, enabled him (His Honour) to say that there was reasonable probability that the applicant's present condition was due to the accident.

Guaranteed, Ltd., v. R. A. Williams.

IN the Shoreditch County Court, on Thursday, before Judge Cluer, Messrs. Guaranteed, Ltd., of 1-3, Sun Street, Finsbury, E.C., lamp shade and electrical fitting factors, sued R. A. Williams, of 33, Tottenham Lane, N., hardware and electrical fitting dealer, to recover £11 11s. 5d. for goods supplied.

An affidavit had been filed by Percy Evelyn Williams, which stated that he had been served with the summons, but he denied that he was R. A. Williams, and said the business belonged to his wife. He had never purchased goods from the plaintiffs.

Mr. ROBINSON, for the plaintiffs, said he admitted he was in a difficulty, but asked that the name of Mrs. Williams should be added to the summons, and that there should be an adjournment for him to make inquiries. If he accepted the affidavit of Mr. Williams, and sued the wife, then the wife might turn round and say that it was her husband's business.

Judge Cluer looked at the order, and found that it was signed in block letters, "R. A. Williams," and both Mr. Williams and his manager, Mr. Wright, having looked at it, denied having signed it, and also said that Mrs. Williams could not have signed it because she was ill in bed. Mr. Robinson said he had not the traveller there to prove the signature.

Judge CLUER said that a reasonable mistake had been made. He adjourned the case to enable the plaintiffs to make full inquiries.

Tucker v. Wandsworth Electric Mfg. Co., Ltd.

THE hearing of this case (*vide* our last issue, p. 53) was continued on July 7th before Mr. Justice Tomlin in the Chancery Division. Mr. J. B. Tucker asked for an injunction restraining the defendants from an alleged infringement of his patent for quick make-and-break tumbler switches.

The defendants, in support of their allegation of prior user and publication, said that switches had been made by Mr. Harry Rose, of Birmingham, before the plaintiff's invention, which contained the same features. Such switches had been used in H.M. ships and defendants alleged prior publication by McGeoch & Co., of Birmingham.

Mr. HOWARD MARRYAT, a member of the Institutions of Electrical and Mechanical Engineers, said he was an electrical contractor, and he remembered coming across the plaintiff's switch at a meeting of the Electrical Development Association in 1921, when it was passed round and discussed by the members. Before its introduction there were, he believed, no quick make-and-break switches with a positive action throughout. The provision of this motion was of great importance because if the spring failed and the switch had no positive motion throughout, the switch might be left in a very dangerous condition without that condition being obvious. The advantage of using a compression spring instead of a tension spring was that the latter was apt, if it broke, to fly into such a position as to cause a short circuit. The compression spring was not so liable and if it was guided it might remain in action if broken.

Mr. A. E. ILIFFE, sales manager of Metro-Vick Supplies, Ltd., said that he sold two models of tumbler switch, and one was the plaintiff's. In his experience the positive and quick make-and-break actions were a great advantage, and

the sale of such switches was likely to increase when the public became better acquainted with it. In cross-examination he said he knew that the Crabtree switch was largely sold. That had positive action at the start of the break and the start of the make.

This completed the case for the plaintiff, and Sir ARTHUR COLEFAX, K.C., making his submissions for the defence, said that the plaintiff's specification was not limited to tumbler switches at all, and there was not one word pointing out that the alleged invention was a particularly useful application in the case of a tumbler switch. So far as he could see the alleged invention purported to be something which was advantageously applicable, if at all, to all electrical switches of the quick make-and-break type of which there were others than the tumbler. This feature of the pivotal connection of a compression spring to the operating member and the contact arm was to be found in the Crabtree specification, which was old. The plaintiff's first claim was the mere addition of common knowledge to a device which was old. It included nothing but direct pivotal connection.

SIR DUGALD CLERK gave evidence with the object of showing that the defendants' switch did not contain anything of the plaintiff's invention.

On July 8th further evidence was called. The secretary of the defendant company said Mr. Rose called on him on October 4th, 1909, and produced specimens of a quick make-and-break switch and asked him to buy it or make it for him. He did not do so but gave him an order for a dozen, two of which were now produced.

Mr. H. W. COX, of Nottingham, said he held a patent of 1914 for improvements in electrical switches, and he supplied switches made to this specification to Harland & Wolff and the Air Ministry, and he had 30 men still making them.

The hearing was concluded on July 9th and his Lordship reserved judgment.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

Automatic Signalling on the District Railway. — On February 6th Mr. W. THORNE asked the Minster of Transport if he was aware that there was a good deal of delay on the District Railway with regard to the early morning trains travelling between Barking and Bow Road, due to the absence of automatic signalling apparatus which was operating on the western section of the line; if he was aware that the London, Midland and Scottish Railway Company had promised to carry out this reform for some considerable time; and if he would state the cause of the delay in carrying out the suggested improvements.

Colonel ASHLEY said he understood that the plans and estimate for the automatic signalling work referred to were finally approved by the company last month, and that it was arranging to carry out the work as soon as possible.

Southern Railway Improvements.—On July 7th, Colonel Ashley informed Mr. BOWERMAN that the Southern Railway Company had stated that it proposed next year to re-open Deptford Station in connection with the introduction of electrical services. The railway company proposed to carry out improvements at New Cross costing about £9,000, and although in consequence of the numerous works already in hand it had been obliged to postpone consideration of effecting improvements at New Cross Gate the desirability of carrying out such improvements would not be lost sight of.

Coal and Electricity.—On July 8th, during the discussion on the Vote for the Ministry of Labour, Sir A. STEEL-MAITLAND, giving reasons for the widespread unemployment in the coal trade, referred to the substitution of oil fuel for coal, and also to the substitution of water power for coal in the generation of electricity. He said that in Germany the utilisation of water-power had been increasing until nearly 1,250,000 h.p. was obtained from water, and every horse-power from water represented a loss of eight tons of coal annually. Taking the continuous power as a third of the full rating, the amount of coal replaced by water power in Germany was about 3,000,000 tons annually. The development of water power in France had been greater than in any other country, except, perhaps, Canada and the United States. No less than 2,500,000 horse-power had been developed from water power, with a corresponding substitution of coal. About one-third of the mileage of the French railways was now electrified, and with the exception of the district between Paris and Orleans he was informed that the whole of that was effected by electricity developed by water power.

Electrical Trade Position.—On July 9th, Sir P. CUNLIFFE-LISTER, the President of the Board of Trade in outlining the position in various industries, said that the exceptions to a general depression in the engineering trade were motors, which were booming, cycles, which were doing well, and the electrical industry, which was comparatively in a very prosperous position and was increasing its business largely, not only in the home market, but abroad.

Wireless Telegraphy (Explanation) Bill.—This Bill was read a second time in the House of Commons on July 10th.

Statutory Gas Companies (Electricity Supply Powers) Bill.—This Bill was read a third time in the House of Lords on July 9th.

Published Specifications.

Compiled expressly for this journal by Patent Agents.
The name of the applicant's patent agent, if any, will be found on the printed specification.
The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1924.

4,246. "Electromagnetic sound-reproducing devices." Fuller's United Electric Works, Ltd., and A. P. Welch. February 19th, 1924. (235,609.)

4,391. "Pole-pieces for telephone receivers and a method of manufacturing the same." British Thomson-Houston Co., Ltd., and A. P. Young. February 20th, 1924. (235,612.)

6,363. "System of overcoming the time-lag in a selenium or other light-sensitive cell, used in a television or like system." J. L. Baird and W. E. L. Day. March 12th, 1924. (235,619.)

6,721. "Train line conductor systems for electric traction vehicles." A. D. Ferguson and Metropolitan-Vickers Electrical Co., Ltd. March 15th, 1924. (235,624.)

6,931. "Variable electrostatic condensers." F. E. Collinson. March 18th, 1924. (235,633.)

6,989. "Crystal detectors for wireless receiving sets." T. Hall and W. H. Southorne. March 18th, 1924. (235,637.)

7,012. "Railway block telegraph instruments." J. Fleming. March 19th, 1924. (235,638.)

7,235. "Device for indicating the power and voltage of electromotors." C. Lott. March 21st, 1923. (213,275.)

7,264. "Means for reversing the direction of the windings of and for short-circuiting reaction coils." J. W. Tennant. March 21st, 1924. (235,651.)

7,279. "Variable inductance devices." Igranic Electric Co., Ltd., A. H. Curtis and G. F. Dandridge. March 21st, 1924. (235,654.)

7,363. "Rectifiers." A. E. White (Fansteel Products Co., Inc.). March 22nd, 1924. (235,658.)

7,595. "Control of electric sub-stations." T. W. Ross, C. Ryder and Metropolitan-Vickers Electrical Co., Ltd. March 25th, 1924. (235,660.)

7,631. "Multicore electric cables." Pirelli General Cable Works, Ltd., B. Valori and R. Horley. March 25th, 1924. (235,661.)

7,653. "Terminals for electrical accessories." J. H. Tucker & Co., Ltd., and J. E. Gaffney. March 26th, 1924. (235,662.)

7,741. "Sound transmitting or emitting apparatus." British Thomson-Houston Co., Ltd. A. P. Young and J. H. Butcher. March 26th, 1924. (235,664.)

9,328. "Electro-responsive devices." British Thomson-Houston Co., Ltd. April 12th, 1923. (214,271.)

11,042. "Control arrangements for electric lighting." Kent-Mitchell, Ltd., and F. G. Galley. May 5th, 1924. (235,690.)

12,113. "Electric control system for repeating the movements of apparatus operated by small power, such as gyroscopic compasses." E. Granat. May 18th, 1923. (216,154.)

12,165. "Supports for electric lamps." H. Hibbert. May 17th, 1924. (235,691.)

12,289. "Protective arrangements for electrical installations." U. Modigliani. May 19th, 1924. (Addition to 208,542.) (235,694.)

12,949. "Automatic control of groups of dynamo-electric machines." English Electric Co., Ltd., and R. A. R. Bolton. May 26th, 1924. (235,701.)

12,950. "Automatic control of groups of dynamo-electric machines." English Electric Co., Ltd., and R. A. R. Bolton. May 26th, 1924. (235,702.)

13,673. "Electrical ignition systems for engines." P. Granclaude. June 4th, 1924. (Convention date not granted.) (225,167.)

14,074. "Electrotherapeutic apparatus." Ajax, Ltd., D. F. Sell and C. A. Cooper. June 10th, 1924. (Addition to 217,720.) (235,709.)

14,145. "Automatic switches for telephone exchange systems." Western Electric Co., Ltd. (G. Deakin). June 11th, 1924. (235,710.)

15,675. "Magneto-microphonic relays." W. Levy, H. Goodwin, and C. F. Adolph. June 30th, 1924. (235,723.)

15,899. "Telephone receivers for use in connection with wireless telegraphy, telephony, and the like." E. M. Styles. July 2nd, 1924. (235,725.)

16,715. "Electric power systems." British Thomson-Houston Co., Ltd. July 26th, 1923. (219,679.)

16,790. "Systems of electric distribution." British Thomson-Houston Co., Ltd. July 13th, 1923. (219,026.)

17,613. "Secret signalling systems." Western Electric Co., Ltd. December 18th, 1923. (Patent of addition not granted.) (226,488.)

17,801. "Instrument or fault detector for testing electric circuits." H. E. S. Holt. July 25th, 1924. (235,737.)

18,037. "Manufacture of cathodes for electric discharge tubes." Naamloose Vennootschap Philips' Gloeilampenfabrieken. February 18th, 1924. (220,622.)

18,797. "Inspection fitting for electrical conduits." W. G. Young and V. F. Cole. August 7th, 1924. (235,744.)

20,319. "Magneto-electric pocket lamps." I. Haggi. August 28th, 1924. (235,751.)

20,775. "Acoustic devices." Western Electric Co., Ltd. (Western Electric Co., Inc.). September 3rd, 1924. (235,754.)

21,376. "Manufacture of materials suitable for formation into electrical resistors." Metropolitan-Vickers Electrical Co., Ltd. October 15th, 1923. (223,542.)

22,982. "Rotors for asynchronous motors." Siemens-Schuckertwerke Ges. October 1st, 1923. (222,869.)

23,103. "Contact device for key switches." Landis & Gyr Soc. Anon. October 10th, 1923. (223 920.)

24,042. "Electric operating mechanism." British Thomson-Houston Co., Ltd. March 5th, 1924. (230,411.)

25,166. "Tramway and other vehicle trucks or under-carriages." S. Thomas and Peckham Truck and Engineering Co., Ltd. October 22nd, 1924. (235,768.)

25,186. "Fixed electric condensers." F. S. S. Wates. October 22nd, 1924. (235,769.)

25,785. "Electrical connectors." British Thomson-Houston Co., Ltd. October 30th, 1923. (224,231.)

26,328. "Automatic or semi-automatic telephone systems." Automatic Telephone Manufacturing Co., Ltd. March 19th, 1924. (Divided application on 218,243.) (Convention date not granted.) (224,255.)

1925.

287. "Electrodes for electric furnaces." Norske Aktieselskab for Elektrokemisk Industri Norsk Industri-Hypotekbank. January 17th, 1924. (227,820.)

933. "Electric circuit-controlling devices." British Thomson-Houston Co., Ltd. January 12th, 1924. (227,473.)

1,188. "Illuminating appliances." W. A. Dorey. January 14th, 1925. (235,797.)

2,833. "Telephone repeater systems." International General Electric Co., Inc. February 2nd, 1924. (228,570.)

3,233. "Holders for incandescent electric lamps." K. Kiyohara. February 5th, 1925. (235,806.)

5,788. "Shock absorber for electric sewing-machine light." Singer Manufacturing Co. April 18th, 1924. (232,539.)

6,386. "Terminal adapter for wireless 'phones or the like," A. A. Field. December 5th, 1924. (235,816.)

7,499. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and J. E. Ostline. March 14th, 1924. (Divided application on 233,607.) (235,818.)

7,501. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and J. E. Ostline. March 14th, 1924. (Divided application on 233,607.) (235 819.)

9,226. "Telephone systems." Coventry Automatic Telephones, Ltd., and J. E. Collyer. April 7th, 1925. (235,824.)